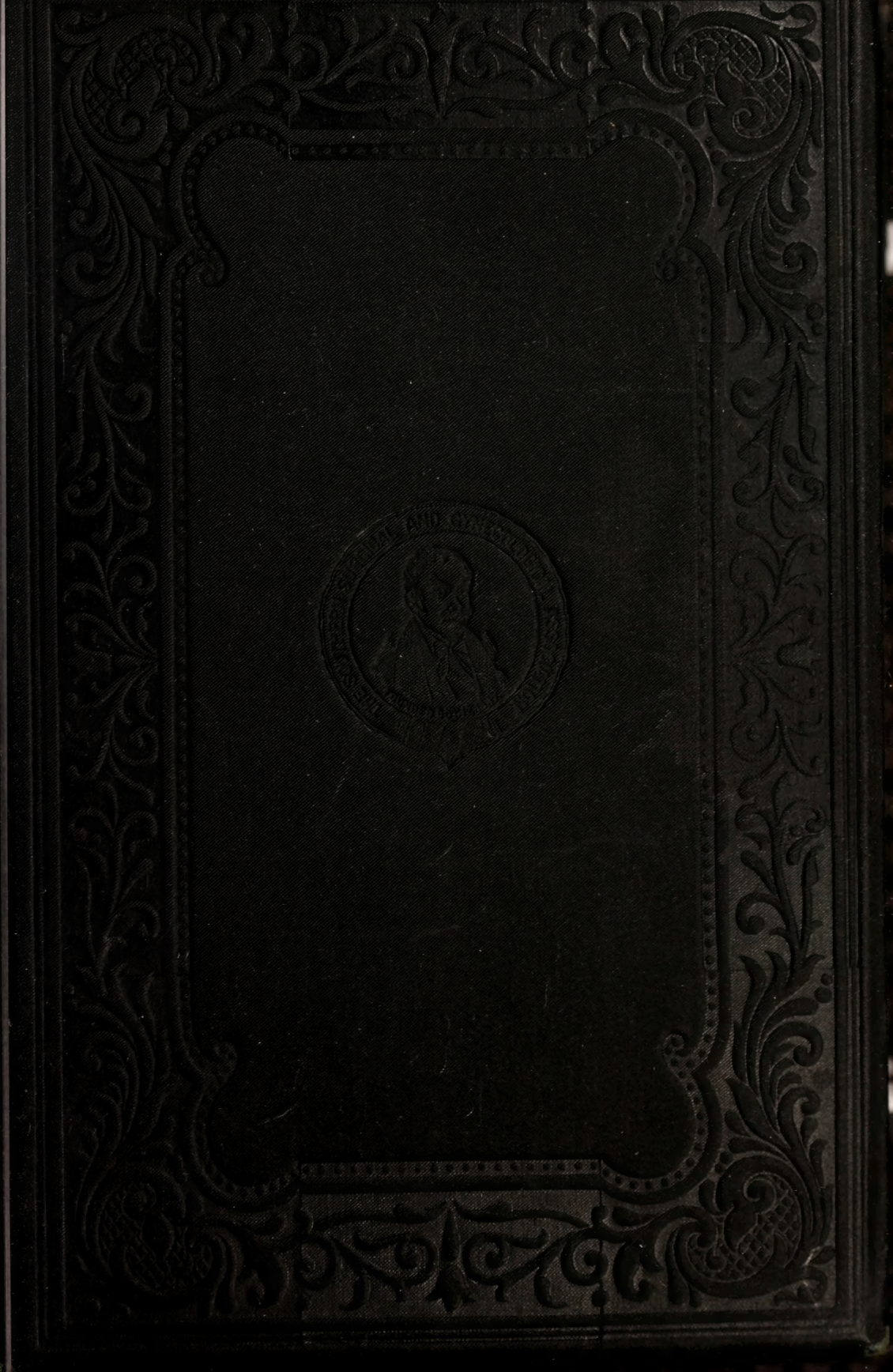

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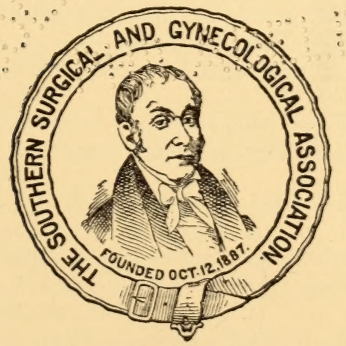

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1908

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OF
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CONTENTS.

Officers vii
List of Officers from the Organization to the Present Time . ix
Honorary Members xi
Members xiii
Constitution xxxv
By-Laws xxxviii
Minutes of the Twentieth Annual Meeting xli

Annual Address of the President. Art Applied to Medicine and Surgery. By HOWARD A. KELLY, M.D 1
Postoperative Complications in Abdominal Surgery. By C. M. ROSSER, M.D. 19
Some Postoperative Complications of Peritonitis. By RANDOLPH WINSLOW, A.M., M.D. 26
Acute Dilatation of the Stomach as a Postoperative Complication By C. JEFF MILLER, M.D. 33
Transperitoneal Removal of Tumors of the Bladder. By CHARLES H. MAYO, M.D. 51
Treatment of the Bladder after Suprapubic Cystotomy for Stone. By WILLIAM S. GOLDSMITH, M.D. 56
The Treatment of Fibroid Tumors of the Uterus Complicated by Pregnancy. By LEWIS S. MCMURTRY, A.M., M.D. . . . 68
Recent Factors in the Elucidation of Chronic Joint Diseases. By C. E. CALDWELL, M.D. 81
The Treatment of Dislocation at the Shoulder-joint Complicated by Fracture of the Upper Extremity of the Humerus. By J. M. MASON, M.D. 94
Fracture of the Femur in Forcible Delivery, with Presentation of a Splint. By CHARLES R. ROBINS, M.D. 125
An Improved Hodgen Splint for the Treatment of Fractures of the Thigh or Other Painful Affections of the Lower Extremity. By GEORGE S. BROWN, M.D.. 129
Practical Points in the Treatment of Fractures of the Femur. By W. P. CARR, M.D. 155
Recent Advances in the Technic of Thoracotomy and Pericardiotomy for Wounds of the Heart. Remarks introductory to a Series of Demonstrations on the Cadaver and with the Stereopticon. By RUDOLPH MATAS, M.D. 175

OCT 14 1908
71872

The Relaxed Knee-joint and its Treatment. By Albert H. Freiberg, M.D. 189
Some Remote Symptoms and Effects of Cholecystitis. By A. Morgan Cartledge, M.D. 199
Suture of the Urethral and Vesical Sphincters for the Cure of Incontinence of Urine, with a Report of a Case. By Hugh H. Young, M.D. 210
The Inconsistencies of the Gauze Pack. By Hubert Ashley Royster, M.D. 218
Cyst of the Pancreas, with Report of an Operation and Exhibition of the Specimen. By Rufus B. Hall, M.D. 229
The Management of Labor in Minor Degrees of Pelvic Contraction, with Special Reference to the Relative Indications for Abdominal Cesarean Section. A Tabulated Report of Eighteen Cesarean Sections. By Henry D. Fry, M.D. . . 239
A Flap Sliding Operation for Rectovaginal Fistula, Leaving Perineum and Sphincter Muscle Intact. Excision of Fistula-in-ano without Cutting the Sphincter Muscle. By George H. Noble, M.D. 263
Treatment of Diffuse Suppurative Peritonitis. By Stuart McGuire, M.D. 269
Harelip and Cleft Palate. By Alex. Hugh Ferguson, M.D. . 278
The Diagnosis of Extra-uterine Pregnancy. By H. J. Boldt, M.D. 308
Subtemporal Decompressive Operations for the Intracranial Complications Associated with Bursting Fractures of the Skull. By Harvey Cushing, M.D. 324
Further Notes on Harmful Involution of the Appendix. By Robert T. Morris, M.D. 331
Cases Illustrating the Value of Intestinal Exclusion as a Surgical Procedure. By John Young Brown, M.D. 337
The Report of Eight Consecutive Cases of Gunshot Wound of the Abdomen, with One Death. By Le Grand Guerry, M.D. . 348
The Mechanism and Clinic of Pulmonary Embolism. By Willard Bartlett, M.D., and R. L. Thompson, M.D. 360
Suppurative Phlegmonous Gastritis, with the Report of a Successful Laparotomy (probably the first) in the Treatment of a Case. By J. Wesley Bovée, M.D. 378
Report of a Case of Inoperable Sarcoma of the Neck Treated Successfully with Coley's Toxins. By John Chadwick Oliver, M.D. 391
Report of a Case of Chronic Parenchymatous Nephritis in which Decapsulation of Both Kidneys was Practised. By John Chadwick Oliver, M.D. 395
Sarcoma of the Brain. By Joseph Ransohoff, M.D. . . . 405
Venous Thrombosis and Hydrocele of the Inguinal Canal. By Joseph Ransohoff, M.D. 406
Hermaphrodism. By George Ben Johnston, M.D. 418

Retroperitoneal Cystic Adenomata. Report of Two Cases. By I. S. Stone, M.D. 426
Hematuria in Pregnancy. By Edward A. Balloch, M.D. . . 431
The Present Status of Gastric Surgery, with Illustrated Cases. By J. Garland Sherrill, M.D. 440
Some of the Reasons Why Cholecystectomy Should not be Performed as Frequently as at Present Advocated by Many Surgeons. By John B. Deaver, M.D. 459
Transperitoneal Ureterotomy for Ureteral Calculus. By Gerry R. Holden, M.D. 467
Report of a Case of Pyonephrosis. By J. A. Goggans, M.D.. . 471
A Case of Sarcoma of the Rectum. By James E. Thompson, M.D. 475
Perinephritic Abscess following Parturition, with Report of Three Cases. By J. Shelton Horsley, M.D. 483
The Sensitive and Short Uterosacral Ligament; Its Clinical Significance and Treatment. By Edward J. Ill, M.D. . . 490
Traumatic Epilepsy. By E. Denegre Martin, M.D.. . . . 496
Leverage in Spinal Disease. By J. D. Bloom, M.D. 505
Surgical Phases of Enteroptosis. By John G. Clark, M.D.. . 508

Clinical Session at Charity Hospital.
Introductory Remarks. By E. Denegre Martin, M.D. . 520
Vaccine Therapy. By C. C. Bass, M.D. 522
Pleuritic Fffusion. By C. C. Bass, M.D. 523
Gonorrheal Epididymitis. By C. C. Bass, M D. 524
Colon Bacillus Pyelitis. By C. C. Bass, M.D. 524
Resection of the Ribs for Sarcoma. By F. W. Parham, M.D. 527
Tuberculous Ureter. By F. W. Parham, M.D. 527
Empyema of the Gall-bladder. By F. W. Parham, M.D . 528
Exstrophy of the Bladder. By James M. Batchelor, M.D. 531
Rubber Adhesive Strips to the Back in the Obscure Pains of Pregnancy. By John F. Oechsner, M.D. 533
Twin Ectopic Pregnancy. By Joseph A. Danna, M.D. . . 536
Fracture of the Patella. By Joseph A. Danna, M.D. . . 537
Matas' Operation for Aneurysm. By Joseph A. Danna, M.D. 539
Matas' Interdental Splint. By Joseph A. Danna, M.D. . 540
Splenectomy for Abscess. Adjustable Hodgen's Splint. By William M. Perkins, M.D. 541
Splenectomy for Abscess. By William M. Perkins, M.D. 541
Adjustable Hodgen's Splint. By William M. Perkins, M.D. 542

Tracheotomy for Foreign Bodies in the Air Passages. Report of Fifty-three Cases. By W. F. Westmoreland, M.D. . . 544
Fractures of the Clavicle. By W. F. Westmoreland, M.D. . 555

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1888.	*W. D. Haggard.	R. D. Webb. J. W. Sears.	*W. E. B. Davis.	Hardin P. Cochrane.
1889.	*Hunter H. McGuire.	W. O. Roberts. *Bedford Brown.	*W. E. B. Davis.	Hardin P. Cochrane.
1890.	*George J. Engelmann.	*Berthold E. Hadra. Duncan Eve.	*W. E. B. Davis.	Hardin P. Cochrane.
1891.	Lewis S. McMurtry.	*J. McFadden Gaston. J. T. Wilson.	*W. E. B. Davis.	Hardin P. Cochrane.
1892.	*J. McFadden Gaston.	*Cornelius Kollock. George Ben Johnston.	*W. E. B. Davis.	Hardin P. Cochrane.
1893.	*Bedford Brown.	Joseph Price. George A. Baxter.	*W. E. B. Davis.	Hardin P. Cochrane.
1894.	*Cornelius Kollock.	A. B. Miles. J. B. S. Holmes.	*W. E. B. Davis.	Hardin P. Cochrane
1895.	Louis McLane Tiffany.	Ernest S. Lewis. Manning Simons.	*W. E. B. Davis.	Richard Douglas.
1896.	Ernest S. Lewis.	Joseph Taber Johnson. Richard Douglas.	*W. E. B. Davis.	A. M. Cartledge.
1897.	George Ben Johnston.	W. E. Parker. Floyd W. McRae.	*W. E. B. Davis.	A. M. Cartledge.
1898.	Richard Douglas.	*H. H. Mudd. James A. Goggans.	*W. E. B. Davis.	A. M. Cartledge.
1899.	Joseph Taber Johnson.	F. W. Parham. W. L. Robinson.	*W. E. B. Davis.	A. M. Cartledge.
1900.	A. M. Cartledge.	Manning Simons. W. P. Nicolson.	*W. E. B. Davis.	W. D. Haggard.
1901.	Manning Simons.	George H. Noble. L. C. Bosher.	W. D. Haggard.	Floyd W. McRae.
1902.	*W. E. B. Davis.	J. Wesley Bovée. J. W. Long.	W. D. Haggard.	Floyd W. McRae.
1903.	J. Wesley Bovée.	Christopher Tompkins. Bacon Saunders.	W. D. Haggard.	Floyd W. McRae.
1904.	Floyd W. McRae.	George S. Brown. J. Shelton Horsley.	W. D. Haggard.	Charles M. Rosser.
1905.	Lewis C. Bosher.	J. D. S. Davis. I. S. Stone.	W. D. Haggard.	Charles M. Rosser.
1906.	George H. Noble.	Stuart McGuire. E. Denegre Martin.	W. D. Haggard.	Charles M. Rosser.
1907.	Howard A. Kelly.	Rufus E. Fort. Hubert A. Royster.	W. D. Haggard.	Charles M. Rosser.
1908.	F. W. Parham.	Henry D. Fry. W. F. Westmoreland.	W. D. Haggard.	Stuart McGuire.

* Deceased.

HONORARY MEMBERS.

1894.—Foy, George,	Dublin.
1894.—Jacobs, Charles,	Brussels.
1894.—Martin, A.,	Berlin.
1902.—Maury, Richard B.,	Memphis, Tenn.
1894.—Morisani, O.,	Naples.
1894.—Pozzi, S.,	Paris.
1902.—Reamy, Thaddeus A.,	Cincinnati, Ohio.
1907.—Tiffany, L. M.,	Baltimore, Md.

MEMBERS.

* Deceased.

1905.—Baker, James Norment, M.D. Visiting Surgeon, St. Margaret's Hospital; Secretary of the Medical Association of the State of Alabama. 719 Madison Avenue, Montgomery, Ala.

1894.—Baldridge, Felix E. Huntsville, Ala.

1900.—Baldy, John Montgomery, M.D. Professor of Gynecology, Philadelphia Polyclinic; Surgeon to Gynecean Hospital; Consulting Surgeon to Frederick Douglass Free Hospital and to the Jewish Hospital. 2219 De Lancey Place, Philadelphia, Pa.

1903.—Balloch, Edward A., M.D. Professor of Surgery, Medical Department of Howard University; Surgeon to Freedmen's Hospital; Member American Academy of Medicine. 1013 Fifteenth Street, N. W., Washington, D. C.

1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

1905.—Bartlett, Willard, M.D. 4257 Washington Boulevard, St. Louis, Mo.

1904.—Batchelor, James M., M.D. House Surgeon of Charity Hospital; Associate Professor of Surgery, Tulane University. New Orleans, La.

1901.—Baughman, Greer D., M.D. Lecturer on Hygiene; Demonstrator of Pathology; Demonstrator of Physiology; in charge of Gynecological Dispensary at Medical College of Virginia. 12 North Second Street, Richmond, Va.

1907.—Bevan, Arthur Dean, M.D. Professor Surgery Rush Medical College, University of Chicago. 100 State Street, Chicago, Ill.

1906.—Bloodgood, Joseph Colt, M.D. Associate Professor of Surgery, Johns Hopkins University; Associate Surgeon, Johns Hopkins Hospital; Surgeon to the Union Protestant Infirmary; Chief Surgeon to St. Agnes Hospital. 904 North Charles Street, Baltimore Md.

1893.—Bloom, J. D., M.D. Consulting Surgeon, Touro Infirmary; Lecturer on Diseases of Children, Tulane University. New Orleans, La.

1901.—Boldt, Hermann, J., M.D. Gynecologist to Post-Graduate Hospital, St. Mark's Hospital, German Polyclinic; Consulting Gynecologist, Beth Israel Hospital; Professor of Gynecology, Post-Graduate Medical School. 39 East Sixty-first Street, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical Department University of Cincinnati); Member American Association of Obstetricians and Gynecologists; ex-President Cincinnati Academy of Medicine; ex-President Cincinnati Obstetrical Society. 432 West Fourth Street, Cincinnati, Ohio.

1890.—Bosher, Lewis Crenshaw, M.D. Professor of Practice of Surgery and Clinical Surgery in the Medical College of Virginia; Visiting Surgeon to the Memorial Hospital; Member of American Surgical Association; Member of the American Association of Obstetricians and Gynecologists; Member of Association of American Anatomists; Member of American Urological Association; ex-President of Richmond Academy of Medicine and Surgery. *Vice-President*, 1901; *President*, 1905. 422 East Franklin Street, Richmond, Va.

1895.—Bovée J. Wesley, M.D. Fellow of American Gynecological Society; President of Washington Obstetrical and Gynecological Society; ex-President Medical and Surgical Society of the District of Columbia; Honorary Fellow Medical Society of Virginia; Professor of Gynecology of George Washington University, Washington, D. C.; Gynecologist to Providence, Columbia, and George Washington University Hospitals; Consulting Physician to St. Ann's Infant Asylum, and Attending Gynecologist to St. Elizabeth's Hospital for the Insane, Washington, D. C. *Vice-President*, 1902; *President*, 1903; *Council*, 1903-1906. The Rochambeau, Washington, D. C.

1902.—Broome, G. Wiley, M.D. Consulting Surgeon, St. Louis City and Female Hospitals; Member St. Louis Medical Society. 612 N. Taylor Avenue, St. Louis, Mo.

1898.—Brown, George S., M.D. Ex-President Jefferson County Medical Society. *Vice-President*, 1904. Birmingham, Ala.

1905.—Brown, John Young, M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital; President of the American Association of Obstetricians and Gynecologists, 1906. St. Louis, Mo.

1907.—Burch, Lucius E., M.D. Professor of Gynecology, Vanderbilt University, Medical Department; Gynecologist, St. Thomas' Hospital, Nashville; Gynecologist, Nashville City Hospital; Captain and Surgeon, N. G. S. T. 150 Eighth Avenue, N., Nashville, Tenn.

1899.—Burthe, L., M.D., 124 Baronne Street, New Orleans, La.

1900.—Byford, Henry T., M.D. Professor of Gynecology, College of Physicians and Surgeons (University of Illinois), Chicago; Professor of Clinical Gynecology, Northwestern University Woman's Medical School; Professor of Gynecology, Chicago Post-Graduate Medical School; Professor of Gynecology, Chicago Clinical School; Surgeon to Woman's Hospital; Gynecologist to Chicago West Side Hospital. 100 State Street, Chicago, Ill.

1902.—Caldwell, C. E., M.D. Professor of Orthopedic Surgery, Miami Medical College; Visiting Orthopedic Surgeon, Cincinnati Hospital; Member Cincinnati Academy of Medicine. 1110 Cross Lane, Cincinnati, Ohio.

1906.—Cannady, John Egerton, M.D. Former Superintendent and Surgeon in-Charge, Sheltering Arms Hospital, Hansford, W. Va. Member American Association Obstetcians and Gynecologists; Honorary Member Kentucky State Medical Association; Chief Surgeon to Reynolds Memorial Hospital, Glendale, W. Va. Register Building, Wheeling, W. Va.

1904.—Carothers, Robert, M.D. Professor of Clinical Surgery, Medical College of Ohio, Medical Department Cincinnati University; Surgeon to the Good Samaritan Hospital; 413 Broadway, Cincinnati, Ohio.

1903.—Carr, William P. M.D. Professor of Physiology and Professor of Clinical Surgery, Columbian University; Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Government Hospital for the Insane, Washington, D. C. 1418 L Street, N. W., Washington, D. C.

*1891.—Cartledge, Abiah Morgan, M.D.

1899.—Cathcart, R. S., M.D. Assistant to Chair of Clin-

ical Surgery in the Medical College of the State of South Carolina. 66 Hasell Street, Charleston, S. C.

1904.—Chambers, P. F., M.D. Attending Surgeon, Woman's Hospital; Consulting Surgeon, French Hospital. 49 West Fifty-seventh Street, New York, N. Y.

1907.—Clark, John G., M.D. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital. 218 South Fifteenth Street, Philadelphia Penna.

1907.—Clark, S. M. D., M.D. Associate Professor Gynecology, Tulane Medical Department; Visiting Surgeon, Charity Hospital. 1435 Harmony Street, New Orleans, La.

1893.—Cocram, Henry S., M.D. 124 Baronne Street, New Orleans, La.

1893.—Coley, Andrew Jackson, M.D. Councillor of the Medical Association of the State of Alabama. Alexander City, Ala.

1902.—Coley, William B., M.D. Clinical Lecturer on Surgery, College of Physicians and Surgeons; Assistant Surgeon in Hospital for Ruptured and Crippled; Attending Surgeon to General Memorial Hospital; Fellow of the American Surgical Association, New York Surgical Society, and New York Academy of Medicine. 5 Park Avenue, New York, N. Y.

1904.—Craig, Daniel H., M.D. Surgeon to Out-patients, Free Hospital for Women; Instructor, Boston Polyclinic. 386 Commonwealth Avenue, Boston, Mass.

1907.—Crawford, Walter W., M.D. Ex-President Perry County Medical Society; Ex-president Mississippi State Medical Association; Surgeon to South Missippi Infirmary. Hattiesburg, Miss.

1902.—Crile, George W., M.D. Professor of Clinical Surgery, Medical College of Western Reserve University; Surgeon to St. Alexis' Hospital; Surgeon to Lakeside Hospital. 275 Prospect Street, Cleveland, Ohio.

1893.—Crofford, T. J., M.D. Professor of Physiology and Clinical Lecturer on Gynecology in the Memphis Hospital Medical College. 155 Third Street, Memphis, Tenn.

1906.—Cullen, Thomas Stephen, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Consultant in Abdominal Surgery, Church Home and Infirmary. Fellow of

the American Gynecological Society; Honorary Member to La Societa Italiana Ostettricia Ginecologia, Rome; Corresponding Member of the Gesellschaft f. Geburtshülfe, Leipzig. 3 West Preston Street, Baltimore, Md.

Founder.—Cunningham, Russell M., M.D. Professor of Practice of Medicine and Clinical Medicine, Birmingham Medical College; Surgeon to the Pratt Mines Hospital. Ensley, Ala.

1906.—Cushing, Harvey, M.D. Associate Professor of Surgery in the Johns Hopkins University. 3 West Franklin Street, Baltimore, Md.

1907.—Danna, Joseph A., M.D. First Assistant House Surgeon, Charity Hospital. Charity Hospital New Orleans, La.

Founder.—Davis, John D. S., M.D. Professor of Surgery, Birmingham Medical College; Surgeon to Hillman Hospital; ex-President of the Jefferson County Medical Society and of the Board of Health of Jefferson County. *Vice-President,* 1905. Avenue G and Twenty-first Street, Birmingham, Ala.

1891.—Dean, G. R., M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of South Carolina State Medical Association; ex-President Association of Surgeons of Southern Railroad. Spartanburg, S. C.

1900.—Deaver, John B., M.D. Surgeon-in-Chief to the German Hospital. 1634 Walnut Street, Philadelphia.

1897.—Dorsett, Walter B., M.D. Professor of Obstetrics and Clinical Gynecology, St. Louis University; Gynecologist to the Missouri Baptist Sanitarium and to Evangelical Deaconess' Hospital. 3941 North Belle Place, St. Louis, Mo.

1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

**Founder.*—Douglas, Richard, M.D.

1903.—Downes, Andrew J., M.D. 1725 Girard Avenue Philadelphia, Pa.

1905.—Dudley, Emelius C., M.D. Professor of Gynecology, Northwestern University Medical School; Surgeon to St. Luke's and Wesley Hospital; Fellow of the American

Gynecological Society; Corresponding Member of the Société Obstétricale et Gynécologique de Paris; Fellow of the British Gynecological Society; One of the Founders of the Congrès Périodique, International de Gynécologie et d'Obstétrique; ex-President of the Chicago Gynecological Society. 1617 Indiana Avenue, Chicago, Ill.

1890.—Earnest, John G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting Gynecologist to the Grady Hospital. 44 Houston St., Atlanta, Ga.

1907.—Elbrecht, Oscar Herman, M.D. Superintendent and Surgeon-in-Charge of St. Louis Female Hospital; *Vice President* St. Louis Obstetrical and Gynecological Society. 5600 Arsenal Street, St. Louis, Mo.

1891.—Elkin, William Simpson, M.D. Professor of Operative and Clinical Surgery, Atlanta College of Physicians and Surgeons; ex-President of the Atlanta Society of Medicine; Surgeon to Grady Hospital. 27 Luckie Street, Atlanta, Ga.

1900.—Ellis, James N., M.D. Surgeon to Grady Hospital; Gynecologist to the Presbyterian Hospital. 1204 Fourth National Bank Building, Atlanta, Ga.

1900.—Ferguson, Alexander Hugh, M.D. Professor of Surgery, Chicago Post-Graduate; Professor of Surgery, Medical Department (College of Physicians and Surgeons), University of Illinois. 10 Drexel Square, Chicago, Ill.

1904.—Finney, J. M. T., M.D. Associate Professor of Surgery, Johns Hopkins University; Surgeon to Outpatients, Johns Hopkins Hospital. 1300 Eutaw Place Baltimore, Md.

1901.—Fort, Rufus E., M.D. Chief Surgeon, Nashville Terminal Company; Surgeon to Southern and Illinois Central Railroads; formerly Superintendent Nashville Hospital; *Vice-President*, 1907. 209 Seventh Avenue, N., Nashville, Tenn.

1895.—Fortier, S. M., M.D. Visiting Surgeon to Charity Hospital. 4422 St. Charles Avenue, New Orleans, La.

1905.—Frank, Louis, M.D. Professor of Abdominal and Pelvic Surgery, Kentucky University Medical Department; Surgeon Louisville City Hospital, 110 West Kentucky Street, Louisville, Ky.

1902.—Freiberg, Albert H., M.D. Professor of Orthopedic Surgery, University of Cincinnati (Medical College of Ohio), and in the Laura Memorial Women's Medical College; Orthopedic Surgeon to the Cincinnati, Presbyterian, and Jewish Hospitals; Fellow of the American Orthopedic Association. 19 West Seventh Street, Cincinnati, Ohio.

1895.—Fry, Henry D., M.D. Professor of Obstetrics, Georgetown University; *Vice-President.* 1601 Connecticut Avenue, N. W., Washington, D. C.

1903.—Gale, Joseph A., M.D. Surgeon-General Norfolk and Western R. R.; ex-President of Medical Society of Virginia. Roanoke, Va.

1901.—Gavin, George Edwin, M.D. 11 South Conception Street, Mobile, Ala.

1902.—Gillespie, Reese B., M.D. Surgeon to Tazewell Sanitarium. Tazewell, Va.

1897.—Glasgow, Frank A., M.D. Professor of Clinical Gynecology of St. Louis Medical College; Gynecologist to St. Louis Mullanphy Hospital; on staff of Martha Parsons Free Hospital; Consulting Surgeon to St. Louis Female Hospital. 3894 Washington Boulevard, St. Louis, Mo.

1903.—Goffe, J. Riddle, M.D. Professor of Gynecology, New York Polyclinic Medical School and Hospital; Gynecologist, New York City Hospital; Assistant Gynecologist to New York Skin and Cancer Hospital; Consulting Gynecologist, St. Joseph's Hospital, Yonkers, N. Y.; Fellow American Gynecological Society. 29 West Forty-sixth Street, New York, N. Y.

Founder.—Goggans, James A., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; Senior Councillor of the Medical Association of the State of Alabama; Fellow of the British Gynecological Society. *Vice-President,* 1898. Alexander City, Ala.

1900.—Goldsmith, W. S., M.D. 262 Jackson Street, Atlanta, Ga.

**Founder.*—Graham, Joseph, M.D.

1892.—Grant, Horace H., M.D. Professor of Surgery in the Hospital College of Medicine; Surgeon to the Louisville City Hospital. 321 Equitable Building, Louisville, Ky.

1905.—Guerry, Le Grand, M.D. Surgeon Columbia Hospital. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Gynecologist to St. Vincent Hospital and Dispensary. Norfolk, Va.

1896.—Haggard, William David, M.D. Professor of Clinical and Abdominal Surgery and Gynecology, Medical Department, University of Tennessee; formerly Professor of Gynecology and Abdominal Surgery, University of the South (Sewanee); Gynecologist to St. Thomas' Hospital; Surgeon to Nashville City Hospital; Member Alumni Association of Woman's Hospital, of New York. *Treasurer*, 1900; *Secretary*. 148 Eighth Avenue, N., Nashville, Tenn.

1892.—Hall, Rufus Bartlett, A.M., M.D. Professor of Clinical Gynecology in the Miami Medical College; Gynecologist to the Presbyterian Hospital; ex-President of the Cincinnati Obstetrical Society; ex-President of the American Association of Obstetricians and Gynecologists; Fellow of British Gynecological Society. 628 Elm Street, Cincinnati, Ohio.

1901.—Hazen, Charles M., M.D. Professor of Physiology, Medical College of Virginia, Bon Air (Richmond), Va.

1896.—Heflin, Wyatt, M.D. Ex-President of the Jefferson County Medical Society. Birmingham, Ala.

1905.—Hendon, George A., M.D. Professor of Principles and Practice of Surgery and Surgical Pathology, Hospital College of Medicine. 1826 Baxter Avenue, Louisville, Ky.

Founder.—Herff, Ferdinand, M.D. 308 East Houston Street, San Antonio, Texas.

1889.—Hill, Robert Somerville, M.D. Councillor of the Alabama State Medical Association; formerly Surgeon of the Second Regiment Alabama State Troops. Montgomery, Ala.

1902.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Fellow of College of Physicians, Philadelphia; Gynecologist to the Howard, Orthopedic, and Philadelphia Hospitals; Fellow of American Gynecological Society. 1821 Spruce Street, Philadelphia, Pa.

Founder.—Hogan, S. M., M.D. Grand Senior Councillor and ex-Vice-President of the Medical Association of the State of Alabama. Montgomery, Ala.

1900.—Hoke, Michael, M.D., B.E. 268 Peachtree Street, Atlanta, Ga.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 223 West Forsyth Street, Jacksonville, Fla.

1891.—Holmes, J. B. S., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee, ex-President of the Georgia Medical Association; Fellow of the American Association of Obstetricians and Gynecologists. *Vice-President*, 1894. Valdosta, Ga.

1900.—Horsley, John Shelton, M.D. Professor of Principles of Surgery and Clinical Surgery, Medical College of Virginia; Surgeon to Memorial Hospital. *Vice-President*, 1904. 303 West Grace Street, Richmond, Va.

1896.—Hundley, J. Mason, M.D. Associate Professor of Diseases of Women and Children, University of Maryland; President Clinical Society of Baltimore. 1009 Cathedral Street, Baltimore, Md.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University. 1420 Eutaw Place, Baltimore, Md.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hospital of Newark, N. J.; to All Souls' Hospital, Morristown, N. J., and to Mountain Side Hospital, Montclair N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1889.—Johnson, Joseph Taber, M.D. Professor of Gynecology and Abdominal Surgery, Georgetown University; formerly Gynecologist to Providence Hospital; Chief of Service of Gynecology and Abdominal Surgery, Georgetown University Hospital, and President of the Board of Administration; President of the Woman's Dispensary, and of the Medical Society of the District of Columbia (1887); Member of the British Medical Association; Fellow of the Gynecological Society; President of the Washington Obstetrical and Gynecological Society; Secretary American Gynecological Society, 1886-1890, and President, 1899. *President*, 1899. 926 Farragut Square, Washington, D. C.

1901.—Johnson, Robert W., M.D. Professor of Surgery,

Baltimore Medical College. Corner Franklin and Cathedral Streets, Baltimore, Md.

Founder.—Johnston, George Ben, M.D. Formerly Consulting Surgeon to the Richmond Eye, Ear, and Throat Infirmary; ex-President of the Richmond Academy of Medicine and Surgery; ex-President of the Medical Society of Virginia; Member of the American Association of Obstetricians and Gynecologists, and First Vice-President, 1896; Member of the Ninth International Medical Congress; Member of the American Surgical Association; Professor of the Practice of Surgery and Clinical Surgery in the Medical College of Virginia, formerly Professor of Anatomy; Surgeon to the Old Dominion Hospital; Consulting Surgeon to the City Free Dispensary. *Vice-President*, 1892; *President*, 1897. 407 East Grace Street, Richmond, Va.

1902.—Jordan, William Mudd, M.D. Surgeon to St. Vincent's Hospital; Gynecologist to Hillman Hospital; formerly Assistant Surgeon, U. S. Marine Hospital Service. Birmingham, Ala.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888-89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1888-99; Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Member Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member Washington Academy of Sciences; Fellow American Gynecological Society *President*, 1907. 1418 Eutaw Place, Baltimore, Md.

1907.—Kirchner, Walter C. G., M.D. Superintendent and Surgeon-in-Charge, St. Louis City Hospital. President Medical Society City Hospital Alumni. City Hospital, St. Louis, Mo.

1899.—Kohlman, William, M.D. 3500 Prytania Street New Orleans, La.

1894.—Leigh, Southgate, M.D. Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President Medical Society of Virginia, 1899-1900. 147 Granby Street, Norfolk.

1893.—Lewis, Ernest S., M.D. Professor of Gynecology, Medical Department of Tulane University. *Vice-President*, 1895; *President*, 1896; *Member of Council*, 1896-1903. 124 Baronne Street, New Orleans, La.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon, Post-Graduate Hospital, and to the Babies' Wards. 24 West Fiftieth Street, New York, N. Y.

Founder.—Long, John W., M.D. Emeritus Professor of Gynecology and Pediatrics in the Medical College of Virginia; formerly Gynecologist to the Old Dominion Hospital and the Richmond City Dispensary; Consulting Surgeon to the Watts Hospital, Durham; Member ex-Orator, and ex-Vice-President of the North Carolina Medical Society. *Vice-President*, 1902. Greensboro, N. C.

1904.—Lupton, Frank A., M.D. 716 North Eighteenth Street, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1895.—McGannon, M. C., M.D. Professor of Gynecology, Medical Department, University of Nashville; Chief Surgeon Woman's Hospital. 118 Eighth Avenue, N., Nashville, Tenn.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. 518 East Grace Street, Richmond Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1905.—MacLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1888.—McMurtry, Lewis S., M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery, Hospital College of Medicine, Louisville; Gynecologist to St. Mary and St. Elizabeth Hospital; Gynecologist to Gray Street Infirmary; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Kentucky State Medical Society; Correspond-

ing Member of the Gynecological Society of Boston; Fellow of the British Gynecological Society; Ordinary Fellow of the Edinburgh Obstetrical Society; Fellow of the American Surgical Society. *President*, 1891; *Member of Council*, Atherton Building, Louisville, Ky.

1888.—McRae, Floyd Willcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Treasurer*, 1901-1903; *President*, 1904. Peters Building, Atlanta, Ga.

1900.—MacDonald, Willis G., M.D. Professor of Surgery (Adjunct), Albany Medical College; Surgeon to Albany Hospital; Chief Surgeon of South End Dispensary; Fellow of the American Surgical Society. 29 Eagle Street, Albany, N. Y.

1900.—Manton, Walter Porter, M.D. Professor of Clinical Gynecology and Adjunct Professor of Obstetrics, Detroit College of Medicine; Gynecologist to Harper Hospital, Eastern and Northern Michigan Asylums for the Insane; Consulting Gynecologist to St. Joseph's Retreat; Vice-President of Medical Board of the Woman's Hospital and Infants' Home. 32 Adams Avenue, Detroit, Mich.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, Edmund Denegre, M.D. Professor of Minor and Clinical Surgery, New Orleans Polyclinic; Visiting Surgeon to the Charity Hospital; Consulting Surgeon to the Eye, Ear, Nose, and Throat Hospital; President Orleans Parish Medical Society; Ex-Vice-Pesident American Medical Association. 115 Chartres Street, New Orleans, La.

1904.—Mason, J. M., M.D. Gynecologist to St. Vincent Hospital. 1915 Sixteenth Avenue, S., Birmingham, Ala.

1899.—Mastin, William M., M.D., Fellow of the American Surgical Association; Member of the American Asso-

ciation of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medical Department of Tulane University; Fellow of the American Surgical Association. 624 Gravier Street, New Orleans, La.

1896.—Matthews, William P., M.D. Professor of Anatomy, Medical College of Virginia; Orthopedic Surgeon to the Old Dominion Hospital. Richmond, Va.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital; Member American Surgical Society; ex-President, Western Surgical and Gynecological Association and of Minnesota State Medical Society. Rochester, Minn.

Founder.—Meriwether, Frank T., M.D. Assistant Surgeon, U. S. A. (Retired). Asheville, N. C.

1899.—Michinard, P. E., M.D. 624 Gravier Street, New Orleans, La.

1888.—Miller, C. Jeff., M.D., Professor of Operative Gynecology, New Orleans Polyclinic; Visiting Gynecologist to Charity Hospital. 1719 Jackson Avenue, New Orleans, La.

1907.—Mitchell, James F., M.D. Surgeon to Providence Hospital. 1344 Nineteenth Street, Washington, D. C.

1901.—Mixter, Samuel Jason, M.D. Surgeon Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough Street, Boston, Mass.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. Washington, D. C.

1903.—Morgan, James B., M.D. Professor of Anatomy and Clinical Surgery, Medical College of Georgia; Chairman Board of Censors, Georgia Medical Association. 1272 Broad Street, Augusta, Ga.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama; Vice-President of Tri-State Medical Society of Alabama, Georgia, and Tennessee. 716 North Eighteenth Street, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of

Surgery, New York Post-Graduate Medical School and Hospital. 616 Madison Avenue, New York, N. Y.

1901.—Mullally, Lane, M.D. Professor of Obstetrics and Diseases of Children, Medical College State of South Carolina; Visiting Physician in Obstetrics and Pediatrics, Roper Hospital. Charleston, S. C.

1905.—Munro, John Cummings, M.D. Surgeon-in-Chief, Carney Hospital; Consulting Surgeon, Quincy Hospital and Framingham Hospital; President of the Society of Clinical Surgery; Member American Surgical, American Academy, and of the Association of American Anatomists. 173 Beacon Street, Boston, Mass.

1891.—Murfree, James Brickle, M.D. Professor of Surgery, University of the South (Sewanee); ex-President of the Tennessee State Medical Society, of the Tri-State Medical Society of Alabama, Georgia, and Tennessee. Murfreesboro, Tenn.

1894.—Murphy, J. B., M.D. Professor of Surgery, Northwestern University; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon, Cook County and Mercy Hospitals. 100 State Street, Chicago, Ill.

Founder.—Nash, Herbert Milton, M.D. Consulting Surgeon to the Retreat for the Sick (Hospital), Norfolk, Consultant to the Staff of St. Vincent's Hospital; ex-President of the Norfolk City Medical Society; Member of the State Board of Medical Examiners of Virginia. 296 Freemason Street, Norfolk, Va.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons; Visiting Surgeon to Grady Hospital; Senior Surgeon to Wesley Memorial Hospital; Senior Surgeon, St. Joseph Hospital. *Vice-President*, 1900. Prudential Building, Atlanta, Ga.

1896.—Noble, Charles P., M.D. Surgeon-in-Chief, Kensington Hospital for Women; Consulting Surgeon, Woman's Hospital; Lecturer on Gynecology, Philadelphia Polyclinic. 1500 Locust Street, Philadelphia, Pa.

1890.—Noble, George H., M.D. Dean and Professor of Abdominal Surgery and Clinical Gynecology, Atlanta School of Medicine; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the

American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President*, 1901; *President*, 1905. 131 South Pryor Street, Atlanta, Ga.

1903.—Nolen, William L., M.D. Visiting Surgeon, Erlanger Hospital; ex-President Chattanooga Medical Society. Loveman Building, Chattanooga, Tenn.

1890.—Nunn, R. J., M.D. Savannah, Ga.

1902.—O'Brien, Matthew Watson, M.D. Surgeon Southern and Chesapeake and Ohio Railways; Member of the American Association for the Advancement of Science. 908 Cameron Street, Alexandria, Va.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1903.—Ochsner, Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1904.—Oechsner, John F., M.D. Professor of Orthopedic Surgery and the Surgery of Children, Post-Graduate Medical Department, Tulane University of Louisiana; Visiting Surgeon, Charity Hospital. 505 Morris Building, New Orleans, La.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1902.—Oviatt, Charles W., M.D. Formerly Professor of Surgery in Milwaukee Medical College; Attending Surgeon, St. Mary's Hospital; Member American Surgical Society. Oshkosh, Wis.

Founder.—Paine, John Fannin Young, M.D. Professor of Obstetrics and Gynecology in the Medical Department, University of Texas; Gynecologist and Obstetrician, John Sealy Hospital; Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Texas Medical Association; Fellow of the Texas Academy of Science. 2177 Market Street, Galveston, Texas.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899; *President*. 1429 Seventh Street, New Orleans, La.

1900.—Park, Roswell, M.D. Professor of Surgery, Medical Department, University of Buffalo; Surgeon, Buffalo General Hospital; Member German Congress of Surgeons, Italian Surgical Society, American Surgical Association, American Orthopedic, and American Genito-urinary Associations. 510 Delaware Avenue, Buffalo, N. Y.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. Macheca Building, New Orleans, La.

1904.—Peters, J. U. W., M.D. Surgeon to St. Vincent Hospital. Birmingham, Ala.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 7 East Thirty-sixth Street, New York.

1900.—Porter, Miles F., M.D. Fellow American Surgical Association. 47 West Wayne Street, Fort Wayne, Ind.

1889.—Potter, William Warren, M.D. Consulting Gynecologist to the Woman's Hospital; Consulting Surgeon to the Buffalo General Hospital; President and Examiner in Obstetrics, New York State Medical Examining and Licensing Board; Chairman of Section of Obstetrics and Diseases of Women, American Medical Association, 1890; President of the Buffalo Obstetrical Society, 1884-1886; President of the Medical Society of the State of New York, 1891; Executive President of the Section of Gynecology and Abdominal Surgery, Pan-American Medical College, 1893. 284 Franklin Street, Buffalo, N. Y.

1889.—Price, Joseph, M.D. Physician-in-Charge of the Obstetrical and Gynecological Department of the Philadelphia Dispensary; Fellow of the American Association of Obstetricians and Gynecologists; ex-Chairman, Section of Diseases

of Women and Obstetrics, American Medical Association. *Vice-President*, 1893. 241 North Eighteenth Street, Philadelphia, Pa.

1899.—Quinn, W. A., M.D. Henderson, Ky.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, Medical College of Ohio; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. Corner Seventh and Race Streets, Cincinnati, Ohio.

1900.—Rees, Charles Mayrant, M.D. Professor of Abdominal Surgery and Gynecology, Charleston Medical School; Abdominal Surgery and Gynecology, City Hospital; Gynecologist to Shirro's Dispensary. Charleston, S. C.

1899.—Richardson, Maurice Howe, M.D. Visiting Surgeon to the Massachusetts General Hospital; Assistant Professor of Clinical Surgery, Harvard Medical School. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *Vice-President*, 1889. 1520 Third Street, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Professor of Gynecology, Medical College of Virginia; Gynecologist to the Memorial Hospital; Surgeon to the Atlantic Coast Railroad. 8 West Grace Street, Richmond, Va.

1889.—Robinson, William Lovaille, M.D. Fellow of the American Association of Obstetricians and Gyencologists; ex-President of the Danville Medical Society; Member of the Medical Examining Board of Virginia; ex-President of

Virginia Medical Society. *Vice-President*, 1899. 753 Main Street, Danville, Pa.

1906.—Rogers, Carey Pegram, M.D. Surgeon to De Soto Sanatorium; Surgeon, Sea Board Air Line Railway; formerly House Surgeon, Johns Hopkins Hospital. 223 West Forsyth Street, Jacksonville, Fla.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Ala.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University College of Medicine; Consulting Surgeon, Parkland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical Association; Vice-President Tri-State Society of Texas, Louisiana and Arkansas. *Treasurer*. 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert A., A.B., M.D. Professor of Gynecology and Dean of the Faculty, Medical Department University of North Carolina; Gynecologist to Rex Hospital; Surgeon-in-Chief, St. Agnes Hospital. *Vice-President*, 1907. Tucker Building, Raleigh, N. C.

1901.—Runyan, Joseph P., M.D. 203 West Second Street, Little Rock, Ark.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President Texas State Medical Association. *Vice-President*, 1903. Ninth and Houston Streets, Fort Worth, Texas.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Texas.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon Temple Sanatorium. Temple, Texas.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the Emergency Hospital, and Central Dispensary; Charter Member Washington Academy of Sciences; Member American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery

and Clinical Surgery, Kentucky University; Consulting Surgeon to Louisville Hospital. 633 St. Charles Place, Louisville, Ky.

Founder.—Shivers, Offa Lundsford, M.D. Councillor of the Alabama Medical Association. Marion, Ala.

1893.—Simons, Manning, M.D. Professor of Clinical Surgery, Medical College, State of South Carolina; Surgeon to St. Francis Xavier's Infirmary; Surgeon to City Hospital; ex-President Medical Society of South Carolina; President of the South Carolina Medical Association; Member American Association of Obstetricians and Gynecologists; ex-Vice-President Tri-State Medical Society of Virginia and the Carolinas. *Vice-President,* 1895 and 1900; *President,* 1901. 111 Church Street, Charleston, S. C.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist to Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1899.—Smythe, Frank Davie, M.D. Surgeon to St. Joseph's Hospital; Assistant Professor of Surgery, Memphis Hospital Medical College; Demonstrator of Operative Surgery; formerly Member of the State Board of Examiners of Mississippi. Porter Building, Memphis, Tenn.

1904.—Stokes, James Ernest, M.D. Salisbury, N. C.

Founder.—Stone, Isaac Scott, M.D. Clinical Professor Gynecology, Georgetown University; Gynecologist to Columbia Hospital, and Associate Gynecologist to Georgetown University Hospital; Member American and British Gynecological Societies; Honorary Fellow of Medical Society of the State of New York; Fellow of the Medical Society of Virginia; Member Washington Academy of Sciences; Washington Obstetrical and Gynecological Society. 1618 Rhode Island Avenue, N. W., Washington, D. C.

1894.—Talley, D. F., M.D. Ex-President of the Jefferson County Medical Society; Professor of Materia Medica and Lecturer on Surgery, Birmingham Medical College. Birmingham, Ala.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—Taylor, William Wood, A.B M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 246 Randolph Building, Memphis, Tenn.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. *Vice-President*, 1903. 116 East Franklin Street, Richmond, Va.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital, etc. 410 North Jefferson Street, St. Louis, Mo.

1905.—Vance, Ap Morgan, M.D. Surgeon to St. Mary and Elizabeth Hospital; Consulting Surgeon, Louisville City Hospital. 921 Fourth Street, Louisville, Ky.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; ex-President of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, N. Y.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President Mississippi Valley Medical Association; President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1905.—Wathen, John R., M.D. Professor of Surgery, Kentucky School of Medicine; Surgeon to St. Anthony's Hospital; Surgeon to Louisville City Hospital and to Kentucky School of Medicine Hospital; President Louisville Clinical Society. 628 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief and Director of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1901.—Werder, X. O., M.D. Gynecologist, Mercy Hospital, Pittsburgh: Professor of Gynecology, West Pennsyl-

vania Medical College; Consulting Surgeon to the South Side Hospital, Allegheny General Hospital, St. Francis' Hospital, etc. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice President.* 241 Equitable Building, Atlanta, Ga.

1904.—Whaley, T. P., M.D. Lecturer Genito-urinary and Renal Surgery, Charleston Medical School; Lecturer Diseases of Skin, Medical College of the State of South Carolina; Surgeon to Sherra's Dispensary; Visiting Surgeon, Charleston City Hospital. 13 Wentworth Street, Charleston, S. C.

1902.—Whitacre, Horace J., M.D., B.S. Professor of Pathology and Surgeon to Clinics, Medical Department, University of Cincinnati; Surgeon to Christ Hospital; Consulting Surgeon to Speer's Hospital; President Cincinnati Research Society; Assistant Pathologist Cincinnati Hospital. 831 Union Trust Building, Cincinnati, Ohio.

1900.—Williams, Howard J., A.B., A.M., M.D. Surgeon to Macon Hospital; ex-President of the Medical Association of Georgia, etc. 550 Orange Street, Macon, Ga.

1900.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief, Johns Hopkins Hospital; Gynecologist to the Union Protestant Infirmary. 1128 Cathedral Street, Baltimore, Md.

1907.—Willis, A. Murat, M.D. Instructor Abdominal Surgery, Medical College of Virginia; Junior Surgeon Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

Founder.—Wilson, J. T., M.D. Ex-President of the North Texas Medical Association; President of the Texas Medical Association; Superintendent of the State Hospital for the Insane. *Vice-President,* 1891. Sherman, Texas.

1905.—Winslow, Randolph, M.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to the Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member American Association of Anatomists. 307 West Granite Street, Butte, Mont.

1891.—Wyeth, John Allen, M.D. Ex-President of the American Medical Association (1901). Professor of Surgery in the New York Polyclinic; Consulting Surgeon to St. Elizabeth's Hospital; Visiting Surgeon to Mt. Sinai Hospital and Polyclinic Hospital; Honorary Member of the Texas State Medical Association; ex-President of the New York State Medical Association; ex-President of the New York Pathological Society. 19 West Thirty-fifth Street, New York, N. Y.

1900.—Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Chief of Clinic, Genito-urinary Surgery, Johns Hopkins Hospital. 1005 North Charles Street, Baltimore, Md.

1902.—Zinke, E. Gustav, M.D. Professor of Obstetrics in Medical College of Ohio; Obstetrician and Gynecologist to German Protestant Hospital; Attending Obstetrician to Ohio Maternity; President of American Association of Obstetricians and Gynecologists. 13 Garfield Place, Cincinnati, Ohio.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

SECTION 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

SEC. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for re-election at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII.

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

Any member who for three consecutive years fails to attend the meetings or present a paper shall be dropped from the roll of membership.

ARTICLE X.

The membership of the Association shall be limited to two hundred.

ARTICLE XI.

All members who have been in continuous membership for twenty years and have attended fifty per cent. of the meetings shall become life members and be exempt from dues.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for the sum of $500 for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided,* that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII.

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV.

No paper read before the Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Council.

ARTICLE XVI.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

TWENTIETH ANNUAL MEETING

OF

THE SOUTHERN

SURGICAL AND GYNECOLOGICAL

ASSOCIATION,

HELD AT THE

ST. CHARLES HOTEL,

New Orleans, Louisiana,

DECEMBER 17, 18 AND 19, 1907

TWENTIETH ANNUAL MEETING.

FIRST DAY.—*Tuesday, December* 17, 1907.

The following-named members were present:

BAKER, JAMES NORMENT	Montgomery.
BALDRIDGE, FELIX E.	Huntsville.
BALLOCH, EDWARD A.	Washington.
BARTLETT, WILLARD	St. Louis.
BATCHELOR, JAMES M.	New Orleans.
BLOOM, J. D.	New Orleans.
BOLDT, HERMANN J.	New York.
BOSHER, LEWIS CRENSHAW	Richmond.
BOVÉE, J. WESLEY	Washington.
BROOME, G. WILEY	St. Louis.
BROWN, GEORGE S.	Birmingham.
BROWN, JOHN YOUNG	St. Louis.
BURCH, LUCIUS E.	Nashville.
BURTHE, L.	New Orleans.
BYFORD, HENRY T.	Chicago.
CADWELL, C. E.	Cincinnati.
CAROTHERS, ROBERT	Cincinnati.
CARR, WILLIAM P.	Washington.
CARTLEDGE, MORGAN	Louisville.
COCRAM, HENRY S.	New Orleans.
CROFFORD, T. J.	Memphis.
CUNNINGHAM, RUSSELL, M.	Ensley.
CUSHING, HARVEY	Baltimore.
FREIBERG, ALBERT H.	Cincinnati.
FRY, HENRY D.	Washington.
GOGGANS, JAMES A.	Alexander City.
GOLDSMITH, W. S.	Atlanta.
GUERRY, LE GRAND	Columbia.
HAGGARD, WILLIAM DAVID	Nashville.
HALL, RUFUS BARTLETT	Cincinnati.
HENDON, GEORGE A.	Louisville.
HOLDEN, GERRY R.	Jacksonville.

Holmes, J. B. S.	Valdosta.
Horsley, John Shelton	Richmond.
Ill, Edward Joseph	Newark.
Johnston, George Ben	Richmond.
Kelly, Howard Atwood	Baltimore.
Kohlman, William	New Orleans.
Lewis, Ernest S.	New Orleans.
McGuire, Stuart	Richmond.
McMurtry, Lewis S.	Louisville.
Martin, Edmund Denegre	New Orleans.
Mason, J. M.	Birmingham.
Mastin, William M.	Mobile.
Matas, R.	New Orleans.
Mayo, Charles H.	Rochester, Minn.
Michinard, P. E.	New Orleans.
Miller, C. Jeff	New Orleans.
Mixter, Samuel Jason	Boston.
Morris, Lewis	Birmingham.
Morris, Robert Tuttle	New York.
Noble, George H.	Atlanta.
Ochsner, Edward H.	Chicago.
Oechsner, John F.	New Orleans.
Oliver, John Chadwick	Cincinnati.
Parham, F. W.	New Orleans.
Perkins, W. M.	New Orleans.
Ransohoff, Joseph	Cincinnati.
Robins, Charles Russell	Richmond.
Rogers, Mack	Birmingham.
Rosser, Charles M.	Dallas.
Royster, Hubert A.	Raleigh.
Runyan, Joseph P.	Little Rock.
Saunders, Bacon	Fort Worth.
Shivers, Offa Lundsford	Marion.
Smythe, Frank Davie	Memphis.
Stokes, James Ernest	Salisbury.
Stone, Isaac Scott	Washington.
Thompson, J. E.	Galveston.
Tompkins, Christopher	Richmond.
Watkins, Isaac LaFayette	Montgomery.
Westmoreland, W. F.	Atlanta.
Winslow, Randolph	Baltimore.
Young, Hugh H.	Baltimore.

Letters and messages of regret were received from the following Fellows who were unable to attend the meeting: Dr. Joseph Taber Johnson, Dr. J. W. Long, Dr. J. B. Murphy, Dr. Joseph N. Ellis, Dr. J. D. S. Davis, Dr. J. M. T. Finney, Dr. H. Tuholske, and Dr. F. F. Simpson.

Morning Session. The Association met at the St. Charles Hotel, and was called to order at 10 A.M. by the Chairman of the Local Committee of Arrangements, Dr. E. Denegre Martin, who, in a brief speech, heartily welcomed the Association back to New Orleans for the third time, and said he was very glad indeed to see the Fellows and hoped they would be pleased with the entertainments which were to be given.

Secretary Haggard stated that, just before leaving Nashville for New Orleans, he received a telegram from President Dr. Howard A. Kelly, announcing that he was unavoidably detained on account of a desperate case; that the patient had come from the far West and was absolutely dependent on him. He would try, however, to get away if possible.

After arriving in New Orleans, Dr. Haggard received the following telegram from Dr. Kelly: "Atmosphere clearing; will arrive Wednesday morning at 10 A.M."

In the absence of President Kelly, Dr. R. E. Fort, of Nashville, First Vice-President, was called to the Chair, and was introduced by Dr. Martin.

Before proceeding with the reading of the papers, the Chair remarked that papers would be limited to twenty minutes, and discussions to five minutes.

The courtesies of the floor were extended to the following physicians: Dr. W. B. Rogers, Memphis, Tenn.: Dr. L. P. Ryan, Chicago, Ill.; Dr. James J. Kelly, Washington, D. C.; Dr. James F. Mitchell, Washington, D. C.; Dr. Walter C. Kirchner, St. Louis, Mo.; Dr. Geo. Edwin Gavin, Mobile, Ala.; Dr. James M. Pfeiffenberger, St. Louis, Mo.

Dr. Martin announced the following entertainments:

Tuesday, 1 to 2 P.M., luncheon at Touro Infirmary, given by the Board of Management and Hospital Staff.

Tuesday, 9 to 12 P.M., smoker at Elks' Home, given by members of the Orleans Parish Medical Society.

Wednesday, 9 A.M., Clinic at Charity Hospital, by request of Council.

Wednesday, 12 M., luncheon and afternoon session at the Tulane Medical College.

Thursday, 1 to 2 P.M., luncheon at the St. Charles Hotel, given by resident members of the Association.

Papers were read, as follows:

1. "Postoperative Complications in Abdominal Surgery," by Dr. Charles M. Rosser, of Dallas, Texas.

2. "Postoperative Complications of Peritonitis," by Dr. Randolph Winslow, of Baltimore, Md.

3. "Acute Dilatation of the Stomach as a Postoperative Complication," by Dr. C. Jeff Miller, of New Orleans, La.

These three papers were discussed jointly by Drs. Byford, Johnston, Hall, Carr, Mayo, Boldt, Mason, Royster, Brown, Stone, Ochsner, and in closing by Drs. Rosser and Winslow.

4. "Transperitoneal Removal of Tumors of the Bladder," by Dr. Charles H. Mayo, of Rochester, Minn.

5. "Treatment of the Bladder after a Suprapubic Cystotomy for Stone," by Dr. W. S. Goldsmith, of Atlanta, Ga.

These two papers were discussed jointly by Drs. Westmoreland, Young, Parham, Bovée, Johnston, Noble, Cunningham, and in closing by Drs. Mayo and Goldsmith.

On motion, the Association adjourned until 2 P.M.

Afternoon Session. The Association reassembled at 3 P.M., with Dr. Fort in the Chair.

6. "The Time and Choice of Operations in Fibroid Tumors Complicated by Pregnancy," by Dr. Lewis S. McMurtry, of Louisville, Ky.

Discussed by Drs. Noble, Boldt, Fry, Bovee, Lewis, Johnston, and in closing by Dr. McMurtry.

7. "Some Recent Factors in the Elucidation of Chronic Joint Disease," by Dr. C. E. Caldwell, of Cincinnati, Ohio.

This paper was discussed by Dr. Freiberg, and in closing by the essayist.

8. "Treatment of Dislocation of the Shoulder-joint Complicated by Fracture of the Upper Extremity of the Humerus," by Dr. J. M. Mason, of Birmingham, Ala.

9. "Fracture of the Femur in Forcible Delivery, with Presentation of a Splint," by Dr. Chas. R. Robins, of Richmond, Va.

10. "Some Results of the Hodgen Splint in the Treatment of Fractures of the Thigh, as Shown by the *X*-rays," by Dr. Geo. S. Brown, of Birmingham, Ala.

11. "Practical Points in the Treatment of Fractures," by Dr. W. P. Carr, of Washington, D. C.

12. "Fracture of the Clavicle," by Dr. Willis F. Westmoreland, of Atlanta, Ga.

All of the papers on fractures were discussed jointly by Drs. Royster, Ochsner, Cunningham, Winslow, Hendon, Perkins, Carothers, Rogers, and in closing by Drs. Mason, Brown, Carr, and Westmoreland.

The Chair appointed as Auditing Committee, Drs. Stuart McGuire, Lewis C. Morris, and Robert Carothers.

The vacancy in the Council, caused by the absence of Dr. Richard Douglas, was filled by Dr. J. Wesley Bovée.

On motion, the Association then adjourned, to meet at 9 o'clock Wednesday at the Charity Hospital.

SECOND DAY.—*Wednesday, December* 18, 1907.

The Association met at the Charity Hospital at 9.30 A.M., by the request of the Council, where a clinical session was held.

1. Dr. E. Denegre Martin exhibited a man who had received fourteen perforations of the intestine, from a gunshot injury, and who was operated on many years ago by the late Prof. A. D. Miles.

2. Dr. Chas. C. Bass resented cases illustrating the surgical application of opsonins and inoculation therapy.

3. Dr. F. W. Parham exhibited (*a*) a case of thoracic resection of the third, fourth, and fifth ribs. The patient was operated on in 1889. (*b*) He exhibited a specimen of large gall-bladder which was removed from a patient without distinctive symptoms of gall-bladder trouble. (*c*) He showed a specimen of tuberculosis of the ureter, with two stones which were discovered at the operation.

4. Dr. Clark presented (*a*) two complicated cases of uterine myoma as types common in colored women. (*b*) A case of infection of the tubes and ovaries illustrating the value of routine rest treatment. (*c*) A case of dyspareunia.

5. Dr. James M. Batchelor presented a case of exstrophy of the bladder.

6. Dr. John F. Ochsner spoke of and demonstrated the principle of the fixation of the sacro-iliac joints in the vague pains of pregnancy, and designated it as a simple method of application.

7. Dr. James A. Danna, House Surgeon of Charity Hospital,

exhibited postoperative cases of (*a*) Multiple operations on the kidney. (*b*) Aneurysm operated by the Matas method. (*c*) Multiple ectopic gestation. (*d*) Postoperative results in fracture of the patella.

8. Dr. C. W. Allen (by invitation) demonstrated a jaw splint (Matas' model) for compound fracture of the lower jaw.

9. Dr. Rudolph Matas spoke of a case in which he ligated the third portion of the subclavian (on the Brasdor plan) for innominate aneurysm with local massive infiltration anesthesia (Braun's solution, eucaine B, 2 per cent.).

He exhibited a patient showing recovery after a radical operation for arteriovenous aneurysm of the femoral vessels in Hunter's canal, caused by a gunshot injury, in which separate suture of both vessels was done (lateral anteriorrhaphy and phleborrhaphy). He exhibited a patient, a young man, aged eighteen years, showing condition of patient ten years after gastrostomy for esophageal stricture, and recovery after evacuation of the mediastinal phlegmon caused by a rupture of the esophagus one month after Abbe's operation.

Adjourned.

Afternoon Session. The Association re-assembled at 2 P.M. at the Tulane Medical College, and was called to order by Dr. Royster.

13. "Tracheotomy for Foreign Bodies; Report of Fifty-three Successful Cases," by Dr. Willis F. Westmoreland, of Atlanta, Ga.

This paper was discussed by Drs. Mixter, Winslow, Ferguson, and in closing by Dr. Westmoreland.

At the conclusion of the discussion on the paper of Dr. Westmoreland, the First Vice-President, Dr. R. E. Fort, took the Chair, and the President, Dr. Kelly, delivered his Address. He selected for his subject, "Art as Applied to Medicine and Surgery."

At the conclusion of the Address, Dr. W. F. Parham moved that the thanks of the Association be extended to Dr. Kelly for his very instructive, entertaining, and admirable address.

This motion was seconded by several.

Dr. Rudolph Matas said: First of all, in the name of the Faculty of the Medical Department of Tulane University, I desire to express our thanks and gracious compliments to you for your thoughtfulness to our University and to our city in presenting us with the portraits of these two distinguished

benefactors of not only our Southern country, but of the entire world—Walter Reed and James Carroll. We shall cherish them and keep them as mementoes, as remembrances, of these great men, and we also hope that in time we shall have these pictures reproduced in more durable form in our City Hall, where our City and State Representatives can see them and remember these great benefactors. (Applause.)

I feel that on this occasion it is appropriate that we should signify in some manner the work Dr. Kelly has done, and if you will pardon me, Mr. President and Gentlemen (I know Dr. Kelly's modesty), I will say that I think it is time that we, as American surgeons and gynecologists, and medical men generally, should give some public expression of the appreciation with which they hold the work that Dr. Kelly has done, not only in stimulating and expounding the esthetics of medicine and surgery, but in raising the standard of our art in a technical and artistic sense, for his beautiful illustrations in connection with medicine and surgery. For several years we have been feasted with the work from his laboratory and pen at great sacrifice of time and of money. He has done more, perhaps, than any other one man to develop the spirit of true art in medical illustrations, and has added immensely to the value of our medical publications. It is with a feeling of admiration akin to reverence that we have seen this magnificent exhibition of the bibliography, the medical archeology, from a lover of art combined with the exposition of the highest knowledge of science. Every man in this audience, every American surgeon, has feasted on the publications that have emanated from the pen and art studio of Dr. Kelly. (Applause.) I have often wondered how it was possible for him to combine true art to the extent he has done with the cultivation of great technical skill. We cannot too strongly emphasize this vote of thanks. This address is going to make our forthcoming volume of TRANSACTIONS sought for by all the libraries of the world, and will immortalize every man who has contributed to its proceedings. (Applause.)

Dr. Charles M. Rosser not only seconded the vote of thanks, but moved that the remarks of Dr. Matas be incorporated in the TRANSACTIONS.

In accordance with the suggestion of the First Vice-President, a rising vote was taken and declared to be unanimous.

Dr. Kelly said: The richest reward is kindly appreciation

of friendship that life brings. There is nothing better that I know of, and I thank you for it. (Applause.)

14. "Recent Advances in the Surgery of the Heart," by Dr. Rudolph Matas, of New Orleans, La.

Discussed by Drs. Cushing and Kirchner, and in closing by the essayist.

15. "The Relaxed Knee and its Treatment," by Dr. Albert H. Freiberg, of Cincinnati, Ohio.

Discussed by Drs. Caldwell and Carothers.

16. "Some Remote Symptoms in Cholelithiasis," by Dr. A. M. Cartledge, of Louisville, Ky.

Discussed by Drs. Morris, Rogers, Rosser, Mayo, Bartlett, Ferguson, Hall, and in closing by the essayist.

17. "Suture of the Urethral and Vesical Sphincters for the Cure of Incontinence of Urine, with a Report of a Case," by Dr. Hugh H. Young, of Baltimore, Md.

This paper was discussed by Drs. Kelly, Ferguson, and Young.

18. "Inconsistencies of the Gauze Packing," by Dr. Hubert A. Royster, of Raleigh, N. C.

Discussed by Drs. Morris, Stone, Cunningham, Brown, Rosser, and in closing by the essayist.

On motion, the Association adjourned until 8 P.M.

Evening Session. The Association reassembled at 8 P.M., with the First Vice-President, Dr. Fort, in the Chair.

19. "Cyst of the Pancreas, with Specimens," by Dr. Rufus B. Hall, of Cincinnati, Ohio.

Discussed by Drs. Byford, Kelly, Goggans, Rogers, and in closing by the essayist.

20. "Management of Labor in Minor Degrees of Pelvic Contraction, with Special Reference to the Relative Indications for Abdominal Cesarean Section," by Dr. Henry D. Fry, of Washington, D. C.

Discussed by Drs. Carr, and Byford.

21. "Flap Sliding for Rectovaginal Fistula, Leaving Perineum or Sphincter Intact," by Dr. Geo. H. Noble, of Atlanta, Ga.

Discussed by Drs. Fry, Byford, Watkins, Ochsner, Robins, and in closing by the essayist.

22. "Treatment of Diffuse Suppurative Peritonitis," by Dr. Stuart McGuire, of Richmond, Va.

Discussed by Drs. Robins, Stone, Brown, and in closing by the essayist.

23. "A Case of Sarcoma of the Rectum," by Dr. James E. Thompson, of Galveston, Texas.

No discussion.

24. "Harelip and Cleft Palate," by Dr. Alex. Hugh Ferguson, of Chicago.

Discussed by Drs. Mayo, Thompson, Horsley, Morris, and in closing by Dr. Ferguson.

On motion, the Association adjourned until Thursday morning, 9.30 A.M.

THIRD DAY.—*Thursday, December* 19, 1907.

Morning Session. The Association met at 9.30 A.M., and was called to order by the President.

25. "The Diagnosis of Extra-uterine Pregnancy," by Dr. Herman J. Boldt, of New York.

Discussed by Drs. Ochsner, Fry, Smythe, Stone, and Goggans.

26. "Decompression in the Treatment of Fractures of the Base of the Skull," by Dr. Harvey Cushing, of Baltimore, Md.

Discussed by Drs. Horsley, Morris, Cunningham, Mason, and in closing by the essayist.

27. "Involution of the Appendix," by Dr. Robert T. Morris, of New York.

Discussed by Drs. McGuire, Balloch, Boldt, and in closing by the author of the paper.

28. "Cases Illustrating the Value of Intestinal Exclusion as a Surgical Procedure, by Dr. John Young Brown, of St. Louis, Mo.

Discussed by Drs. Mayo, McMurtry, Bartlett, Ochsner, Ferguson, and in closing by the essayist.

29. "Report of Eight Consecutive Cases of Gunshot Wound of the Abdomen, with One Death," by Dr. Le Grand Guerry, of Columbia, S. C.

Discussed by Drs. Winslow, Caldwell, Brown, Hendon, Cunningham, Goggans, Ferguson, and in closing by the essayist.

The Secretary presented the following report of the Council:

REPORT OF THE COUNCIL.

1. The Council would respectfully recommend that Article XI of the Constitution, which reads: "All members who have been in continuous membership for twenty years and have attended 50 per cent. of the meetings shall become life members and be exempt from dues," be repealed. It is believed that while the sentiment of the Article is praiseworthy, its actual operation is undesirable, as the amount of dues is not a hardship, and many of the men would be unwilling to relinquish their actual membership; it would not make any real vacancies on the roster for new members, but would, after a few years, place a large number of men, many of whom are comparatively young, on a sort of pension list, without their wish or consent, and with a still limited membership would in time make a considerable proportion exempt from dues, to whom the Association would still be compelled to send the TRANSACTIONS.

2. The Council recommends that in Section 2 of Article IV of the Constitution, in reference to honorary members, that the word "twenty-five" be substituted for ten," and that Dr. L. McLane Tiffany, of Baltimore, be made an honorary member.

3. That in Article X of the Constitution pertaining to the limitation of membership, the word "active" be inserted before "two hundred." (Under the rules any changes in the Constitution lie over for one year.)

4. That in Article I of the By-Laws, the date of meeting shall be changed from the second Tuesday in November to Tuesday, Wednesday, and Thursday of the week preceding the week in which Christmas Day occurs, in accordance with the vote of the Association by postal card.

5. The Council reports the deaths of Dr. A. V. L. Brokaw, of St. Louis, and Dr. Joseph Graham, one of the Founders, of Charlotte, N. C.

6. The resignations of Drs. N. P. Dandridge, Cincinnati, and Wm. E. Parker, Hot Springs, Ark., are recommended for acceptance. Five members have been dropped for non-payment of dues.

7. The Council would recommend for the eleven vacancies occasioned by death, resignation, transference from active to

honorary membership, and by non-payment of dues, the following:

Dr. A. D. Bevan, Chicago, Ill.
Dr. S. M. D. Clark, New Orleans, La.
Dr. Walter W. Crawford, Hattiesburg, Miss.
Dr. James A. Danna, New Orleans, La.
Dr. O. H. Elbrecht, St. Louis, Mo.
Dr. G. E. Gavin, Mobile, Ala.
Dr. Walter C. G. Kirchner, St. Louis, Mo.
Dr. James F. Mitchell, Washington, D. C.
Dr. Arthur C. Scott, Temple, Tex.
Dr. Stephen H. Watts, Charlottesville, Va.
Dr. A. M. Willis, Richmond, Va.

8. The Council would recommend that St. Louis be the next place of meeting, and that Dr. John Young Brown be appointed Chairman of the Committee of Arrangements.

9. The Council recommends the following officers: *President*, Dr. F. W. Parham, of New Orleans, La.; *Vice-Presidents*, Dr. Willis F. Westmoreland, of Atlanta, Ga., and Dr. Henry D. Fry, of Washington, D. C.; *Treasurer*, Dr. Stuart McGuire, of Richmond, Va.; *Secretary*, Dr. W. D. Haggard, of Nashville Tenn. (The Secretary and Treasurer are elected for five years.)

To fill the vacancy on the Council made by Dr. Parham, Dr. Howard A. Kelly, of Baltimore, Md., Dr. George Ben Johnston, of Richmond, Va., is recommended to succeed himself.

Respectfully submitted,

GEO. BEN JOHNSTON,
LEWIS S. MCMURTRY,
F. W. PARHAM,
GEO. H. NOBLE,
Members of Council.
J. WESLEY BOVÉE,
Acting Member.
HOWARD A. KELLY,
W. D. HAGGARD,
Ex-officio.

On motion of Dr. J. Wesley Bovée, the report of the Council was adopted as presented.

The President appointed Drs. Cartledge and Bovée to escort the incoming President to the Chair.

Dr. Parham, in accepting the Presidency, said:

I desire to thank you for the distinguished honor you have conferred upon me. I confess, however, considerable embarrassment in accepting this position. I should very much have preferred that the mantle of the distinguished gentleman who preceded me should have fallen on other shoulders more capable of bearing the responsibility. However, gentlemen, if a mistake has been made, it is your mistake. All I can say is, I shall do the best I can to keep up the traditions of this Association. (Applause.)

The Auditing Committee, to whom were referred the accounts of the Secretary and Treasurer, reported as follows:

REPORT OF THE AUDITING COMMITTEE.

The following are the reports of the Secretary and Treasurer:

To the Officers and Members of the Southern Surgical and Gynecological Association:

The following is a statement of the collections and disbursements:

January 1, 1907, balance in bank		$50 00
January to December, 1907, dues received . . .		1930 00
		$1980 00

DISBURSEMENTS.

1906		
December 13	By cash to William Whitford, stenographer	$60 00
1907		
June 22.	Two checks to C. M. Rosser, Treasurer	1469 85
December 14.	Certified check to C. M. Rosser, Treasurer, for balance . . .	450 15
		$1980 00
	There remains uncollected from members	380 00

The death of Dr. A. V. L. Brokaw, of St. Louis, Mo., in January, 1907, and of Dr. Joseph Graham, of Charlotte, N. C., is respectfully reported.

Dr. N. P. Dandridge has resigned.

One member has dropped out for non-payment of dues.

There are 197 members in good standing. Nine are subject to being dropped from the roll at the present meeting of the Council.

Respectfully submitted,
W. D. Haggard.

Dr. H. A. Kelly, President Southern Surgical and Gynecological Association.

Dear Doctor.—In report of Treasurer covering receipts and disbursements since last meeting, I beg to submit bank book and checks canceled, which, as will be shown, leaves a cash balance to Association's credit at American National Exchange Bank, in Dallas, Texas, on December 14, 1907, of $1470.57.

Respectfully,
Charles M. Rosser,
Treasurer.

We find that the books and accounts of the Secretary and Treasurer have been correctly kept, and supported by proper vouchers.

Stuart McGuire,
Robert Carothers.

On motion of Dr. Bovée, the report of the Committee was adopted and filed.

30. "The Mechanism and Clinic of Pulmonary Embolism," by Drs. Willard Bartlett and R. L. Thompson, of St. Louis, Mo.

Discussed by Drs. Horsley, Mayo, Matas, Hall, and in closing by Dr. Bartlett.

On motion, the Association adjourned until 2 p.m.

Afternoon Session. The Association reassembled at 2 p.m., with the President in the Chair.

Dr. Guerry, of Columbia, S. C., offered the following amendment to Article X of the Constitution: Insert the words, "No member of the Council shall be eligible for re-election." (To lie over.)

31. "A Retroperitoneal Cystic Adenoma," by Dr. I. S. Stone, of Washington, D. C.

32. "Leverage in Spinal Disease," by Dr. J. D. Bloom, of New Orleans, La.

33. "Suppurative Phlegmonous Gastritis, with Report of a Successful Laparotomy in the Treatment of the Case," by Dr. J. Wesley Bovée, of Washington, D. C.

Discussed by Dr. Stone, and in closing by the essayist.

34. "(*a*) Report of a Case of Inoperable Sarcoma of the Neck Treated by the Use of Coley's Fluid; (*b*) The Complete History of a Case of Decapsulation of Both Kidneys for Chronic Parenchymatous Nephritis," by Dr. John C. Oliver, of Cincinnati, Ohio.

Discussed by Drs. Mixter, Goggans, Ransohoff, and in closing by the author of the paper.

THE SECRETARY.—I am requested by the Council to nominate Dr. Walter G. Kirchner, of St. Louis, Mo., for the last vacancy in the roster of membership, made by the transfer of Dr. McLane Tiffany to the honorary list from the active list.

On motion, the action of the Council was concurred in.

35. "The Short and Sensitive Uterosacral Ligament; Its Clinical Significance and Treatment," by Dr. Edward J. Ill, of Newark, N. J.

36. "Transperitoneal Ureterotomy for Ureteral Calculus," by Dr. G. R. Holden, of Jacksonville, Fla.

37. "Venous Thrombosis and Hydrocele of the Inguinal Canal," by Dr. Joseph Ransohoff, of Cincinnati, Ohio.

Discussed by Dr. Mack Rogers.

38. "A Remarkable Case of Hermaphroditism," by Dr. Geo. Ben Johnston, of Richmond, Va.

Discussed by Dr. Freiberg.

39. "Nephrectomy for Hematuria of Pregnancy," by Dr. Edward A. Balloch, of Washington, D. C.

The following papers were read by title:

"Report of a Case of Pyonephrosis," by Dr. J. A. Goggans, of Alexander City, Ala.; "Perinephritic Abscesses following Parturition," by Dr. J. Shelton Horsley, of Richmond, Va.

Dr. A. M. Cartledge offered the following resolution of thanks:

Resolved, That the thanks of the Association be extended to the profession of New Orleans for the splendid manner in which the Fellows have been entertained by the Chairman of the Committee of Arrangements, Dr. Martin, and other members of the profession generally of New Orleans; to the Parish Medical Society for the excellent luncheon served, and also for the elegant luncheon and entertainment today.

Resolved, Further, that the thanks of the Association be extended to our efficient officers.

On motion, the resolution was unanimously adopted.

The Secretary then moved that the Association adjourn, to meet in St. Louis, in 1908, which was seconded, but before putting the motion President Parham said: "We have had at this meeting seventy-six members present. There were at the Baltimore meeting eighty-two. At this meeting there have been thirty-seven papers read, whereas at Baltimore there were only thirty papers read. I understand from the official stenographer that there has been more general discussion at this meeting than at any other at which he has served in that capacity. I think, therefore, we can say that this has been a very successful meeting, and we ought to go away encouraged by it to go to St. Louis next year, and, if possible, have a larger attendance and make that meeting greater than this, if it is possible to do so.

The motion to adjourn was then put and carried.

W. D. HAGGARD, M.D.,
Secretary.

The Association does not hold itself responsible for the views enunciated in the papers and discussions published in this volume.

W. D. HAGGARD, M.D., *Secretary*,
NASHVILLE, TENN.

ANNUAL ADDRESS OF THE PRESIDENT.

ART APPLIED TO MEDICINE AND SURGERY.

By Howard A. Kelly, M.D.,
Baltimore.

The choice of a subject for a Presidential address must always prove a somewhat difficult and embarrassing task, as the lecturer is perforce debarred from the wide range of current topics which form the basis of discussions in the regular meetings of the Association. Thrust forward for a brief period as the representative head of the Association, the President is not expected at so important a juncture to broach any subject of but slight general interest, nor ought he to delve too deeply into technical matters simply in order to magnify his office and display erudition which he may or may not possess. An important element, I take it, in such an address is that of a novel theme which may perchance be refreshing while at the same time imparting useful knowledge.

It is natural for our older men approaching the period of rest from their own labors to become reminiscent, to seek to refresh their auditors by recollections of bygone days and the thrilling scenes through which they have passed as they make the honored dead once more to live and move and walk among us, in order that the younger men who hear them may be stimulated to like efforts and may determine in turn to emulate their spirit of self-sacrifice, while they resolve to purge themselves afresh of all that is ignoble as they set out, henceforth

to prosecute their labors on higher and better lines. The reminiscent address, however, is one of only periodic utility; too often it wearies the hearer like overmuch moralizing. We like at long intervals to visit the graves of the departed, but not to dwell there, for the graveyard soon palls upon us. I think once in five or ten years is often enough for such an essay, unless, indeed, the attractions of a rare historic locality, like that of this most interesting city, New Orleans, suggests some peculiar fitness for such a theme and almost compels one to break the wise rule—that of indulgence only after a protracted period of abstinence.

It suddenly struck me like a little gleam of light that you might, perchance, care for an unvarnished talk constructed from materials which I could gather within the four walls of my medical library, as well as from my daily clinical activities, relating to the matter of medical illustrations, historically and practically considered.

I have been keenly interested in this subject for many years, both as a collector and stimulator of medical art, and so with great pleasure bring before you in rapid review some of the great medical writers of the bygone centuries and show you to what extent they have found it wise and feasible to illustrate their works themselves or make use of artists or their counterfeits as co-laborers. I shall ask you to note how far art has been a useful handmaid to medicine in the past and to note further the curious and extreme fluctuations in the quality of illustrations and the remarkable progress made in the past few years. You will find, I think with surprise, that medical men have, with such rare exceptions that they can be counted on the fingers, not been able to secure the highest artistic skill within recent years.

Printing with movable type was discovered about the year 1452, but printed pictures and printed books even were made from carved blocks of wood (xylography) for some fifty years before this date. One of the earliest dated prints is a picture on a card for the pious—a St. Christopher carrying

the Infant Saviour across the flood, made in the year 1423. This was a wood cut, and was obviously done for manifolding, but Baron Reiffenberg found an incontestable wood engraving of 1406, which is now in the Brussels Museum.

The first-dated copper plate engraving is a crude representation of the flagellation of Our Lord, made in the fifth decade of the fifteenth century (1446). Of illustrations in medical works, except in MSS., the earliest I can yet find are in an edition of *Marianus and Albucasis* (1484), with rough woodcuts.

Della Torre (1442–1505) is said to have had his works illustrated by himself and Da Vinci, but these volumes or MSS. have never been found. The earliest printing from movable type was of Bibles and psalters and various classical works not calling for illustration, but as printing became more widely used the wood engraver began to realize the adaptability of his art, at least in its crudest form, to the printed page, and thence onward illustrations to elucidate the text became more and more common.

There were three stages in the art of engraving as we trace it down into the nineteenth century: First, the simple outline of curved or straight lines to represent forms only, then the remarkably successful attempts to depict chiaroscuro by shading, and lastly, the attempt to produce warmth and texture to give tone and color effects.

The first characterizes the work of the very earliest engravers and that of many of their followers, even down to our own day, and will doubtless ever have an honorable place in scientific work when skilfully used. The second was brought to a high state of perfection by Albert Dürer early in the sixteenth century; while the third, the child of the next century, has practically never been attempted until recent years, and by processes other than those which governed the art of illustrating throughout the first three hundred and fifty years of which I speak particularly.

The most ambitious attempts in the association of the art

of engraving with medicine are best seen in the interesting and elaborate frontispieces of many of the big folio volumes of the sixteenth and seventeenth centures. The artist seems to have felt that here alone his talent had room to exercise itself as the skilled fingers pushing the burin followed the play of the imagination as he depicted the teacher and his pupil interested in their work, or as he devised idealized tutelary divinities inspiring the theme.

We might mention here the names of a few great printing houses, and first Schott, the learned Strasburg printer, who printed an edition of *Marianus and Albucasis* (1484), which is specially noted for having woodcuts. He was also the first to issue an Atlas (1510) giving a representation of the position of the human intestines based on autopsy. There was also a woodcut of the skeleton issued in single sheets, which brought him great renown.

One famous printer had attained high reputation as a physician. This was Charles Estienne (1550), who came of a family of printers busy issuing books from 1496 to 1659. To the earlier Estiennes we owe a complete edition of Galen and many other medical works. When Charles joined the firm, the first volume he issued was one of his own, *On Dissections*. He seems to have been influenced to partially desert medicine from the fact of meeting Paul Manutius (house of Aldine) while travelling in Italy, who perhaps roused a dormant love of books in this descendant of the famous house of Estienne.

Froben, of Bale (1460–1528), the friend of Erasmus, by whose textual accuracy he was helped, rivalled the Aldine in his beautiful text, and has given us a fine Hippocrates and an *Ætius Amidenus*, and another printer of that date was Wechel, who printed specially fine editions of Fallopius and Dioscorides, with Sylburg as reader, the press reading in those days demanding the highest scholarship.

The *Aldine Press* at Venice, which was carried on for three generations and printed from 1494 to 1597, takes the lead in beautiful type and paper. Some of the works in my library

seem to be forty rather than four hundred years old. Plantin, another house famous in 1514–1589, in the Netherlands, had the services of all the best Dutch engravers to illustrate its books. Forestus, the surgeon, who wrote, in 1522, of the "errors of women physicians and such like stuff," had his later works printed here.

Of the Elzevirs, whose activity extended from 1583 to 1712, I need not say much, for you all know their beautiful books, and if you should come across their Harvey's *Exercitationes* (1651) and their *Willis* of 1670, regard them as treasures.

Baskerville (1706–1775) did not print many medical works, but William Hunter's huge folio, *Anatomia Uteri Humani Gravidi*, with its wonderful type, ink, and paper, makes one regret he did not print more. He combined in his books all the virtues and none of the faults of all preceding printers.

If, by chance, you come across a work printed by Field, a London printer of 1596, you will be lucky, for he printed the first folio of Shakespeare, and his books are rare.

The first illustration I show is but quasi medical, taken from a well-known block book, the *Ars Moriendi*, which had a wide circulation in Europe both before and for some time after the invention of printing from movable type. In this book both the pictures, with their mottoes, and the solid pages of text were cut in a block of wood after the fashion of a large wood engraving. It is foreign to my purpose to pause here in order to call attention to the clever art displayed in this antique illustration, to note the excellent perspective, variation in the expression of the faces, or the clever way in which the form and texture of the garments is indicated. I draw attention to this picture on account of the figures of the medical men standing in consultation by the bedside of the dying man. So far as I know, unless an older printed copy of the doctor in the Todtentanz is found, these are the first figures of physicians ever printed, certainly the first of the physician at the bedside or in a consultation.

The first illustrated medical work worthy of note except-

ing several minor crude illustrations in earlier volumes, was that of John Ketham, a German physician, who published, in 1495, his *Fasiculus Medicinæ*, which attained great popularity and ran through successive editions for about one hundred years.

The illustrations show a high order of artistic skill. My own copy of 1500 has the rare colored plates of such value to students of costume of the period. The master is seen teaching anatomy with his text-book before him, apparently quite detached from the scene below, the dissection being carried on under the direction of an assistant standing at the head of the corpse; the actual dissector is obviously an elderly servant, who goes at his work suitably attired in ample apron to protect the body and sleeves well rolled up. The dead subject, laid on a board simply set on two carpenter's horses, is natural except in the colored editions, where the corpse is represented bleeding from an incision which is being made with a big curved knife best suited for flaying and coarse dissections. The varied interest and the indifference of the bystanders is also striking. The art of woodcutting is here represented in perhaps its highest degree of development in its first stage, that of simple lines; there is no attempt to represent shadows by cross-hatching. There are no anatomical pictures in the sense of a series of dissections in this book. In the first part, devoted to surgery, is a simple highly artistic outline of the human figure, evidently by the same trained hand. Various offensive weapons are depicted as assaulting the body, from a stone and a blunderbuss to a butcher's knife, dagger, spear, and arrows. This appears to be the forerunner of those popular plates, still found in our Surgeries, which show the aspiring student of surgery just where the arteries are to be found for ligature in cases of hemorrhage.

The illustrations in Berengarius de Carpi's *Isagogæ breves in Anatomiam Corporis Humani* (1522) some forty-five years after Ketham are not so good, the artist seeming

more at home in outline of figure and drapery than the anatomy of the interior of the body. De Carpi dissected nearly 100 bodies, and therefrom brought so much enlightment that he has been called the restorer of the science of Anatomy. Perhaps he is even better known for his descriptions of the spinal marrow and his discovory of the use of mercury for syphilis.

Crude in comparison is the woodcut frontispiece in the *Compendium of Surgery* (1530) of Marianus Sanctus, the great lithotomist of Baroletta, where, set in a highly ornamental framework, is a picture of Marianus seated before his revolving bookstand while two patients or students appear coming to consult him. The "Marian" operation for stone described in this book is the oldest description we have of an operation which maintained its place for some hundred years and lost none of its horrors.

While these books were being made for the medical public an enormous change was being wrought in the history of the engraver's art by Albrecht Dürer, who laid down his life with his burin in 1528. This change consisted of no less an addition to the possibilities of the art than the perfect representation of shadows, constituting, therefore, a radical departure from the simple line engravings hitherto employed. Dürer depicts himself in his work, the *Symmetry of the Human Body* (1528), drawing a sitter on a reduced scale to true geometrical proportions and making use of an apparatus he himself invented. A free use of cross-hatched lines represent the shadows about the bed and behind the artist, and remember, all the white squares and rhomboids were cut out, leaving the black lines from which to print the picture. No wonder many of the little dividing lines were broken down either in the making of the block or in printing.

It was about this time that the first and long-time favorite work on obstetrics appeared. The *De Partu Hominis* (1513) of Eucharius Rhodion, giving us the earliest pictures of false presentations of the fetus, together with the recommendation

to turn the position into a head presentation if possible. The figures are the crudest kind of woodcut, but they did service and satisfied the demands of the sixteenth century. Nearly the whole of this was translated and most of the cuts used by one Thomas Raynalde and entitled the *Byrthe of Mankynde* (1545), a copy of which sold at Sotheby's in 1905 for £40 ($200).

1478 saw the *Anatomia* of Mundinus, a surgeon and anatomist of Bologna and Professor of Pathology at Marburg, born 1315. His books were issued after his death, and in an edition of 1541, edited by one John Dryander, a Marburg anatomist, are woodcuts similar in style to those in the *Byrthe of Mankynde*. Mundinus calls the cecum the "monoculum sive cecum."

Most of you have seen the engravings in the fine Vesalian folios. Those in the first edition (1543) were drawn and engraved by one Giovanni Calcar, a pupil of Titian, though it is believed Titian did many of them himself. They have also been ascribed to Titian's son and Titian's brother. But it must not be forgotten that Leonardi da Vinci and Della Torre, the anatomist for whom he worked, have been styled the founders of true iconographic anatomy and perhaps even of the descriptive, rediscovered by Bichat. In a sketch-book of Da Vinci's at Windsor Castle, which Robert Knox, the Edinburgh anatomist, got permission from the Queen to go and see, and which has since been published by Rouveyre, Paris, there is a drawing of the semilunar valves of the aorta in a variety of positions so as to show their physiological action and the corpuscles of Arantius have not been forgotten. All this before Fabricius and Harvey, and even before Vesalius.

The woodcuts in Estienne's (Stephanus) *De Dissectione Partum Corporis Humani* (1545), an excellent and original work on Anatomy, are again an improvement on Dürer. Estienne came of a celebrated family of printers, Lutherans of the sixteenth century. He became a doctor in 1542, was persecuted, imprisoned, and died in 1564. His book was

written in conjunction with Etienne Rivière, a fellow surgeon, who saw to the carrying through of the illustrations. Estienne was exceedingly anxious that these should be of the best technically, and invented a syringe with which he introduced air into the bloodvessels before the sketches were made.

Jacob Ruffen's *De Conceptu et Generatione Hominis* (1554) and his *Book for Midwives* have woodcuts somewhat coarse in texture and hardly up to date, but it is more than probable that the cuts were borrowed from earlier works on the same subject. This author instructed midwives, wrote astrologies, astronomical works, and first showed pictures of obstetric instruments. The next illustrations to which I draw your attention are in Valverda's *Anatomia,* of 1560, written first in Spanish, with the title of *Historia de la Composicion del Cuerpo Humano* (1556). Valverda introduced Vesalius and dethroned Galen, and noting some points both in the print and pictures of Vesalius which needed elucidation, he did this and had the plates finely engraved on copper by one Gaspar Bezerra, the most noted engraver of that itme. For his own book he made many of the pictures himself. One, well known, is an écorché or flayed figure holding up his own skin in one hand. The picture is in the first edition, and the finer work is noticeable, when contrasted with the pictures in Vesalius to which I have referred.

Almost the same figures and excellent work are found in the *Tabulæ Anatomica* (1564), by Eustachius. Of the author, an anatomist of Rome, little is known save through his books. He defended Galen against Vesalius, but did not go as far as Silvius, who, forced to admit Galen's inaccuracies, said: "Man had changed, but not for the better." Eustachius was the first to note the suprarenal glands and to give an exact description of the thoracic cavity. His engravings were deservedly acknowledged the finest, but, like many other works of art, were lost after the author's death and only found in 1712, when, by the advice of Fantoni and Morgagni and through the loving care of Lancisi, who edited the text, the

book was republished with eight fresh plates discovered at the same time. It passed through many editions published in other cities, some very poor, but in 1744 Albinus reëdited the text and superintended the issuing of a fine folio at Leyden, and again did this in 1762.

Mention ought to be made of Ambroise Paré, surgeon-royal to four French kings, and who was hidden by Charles IX himself during the massacre of St. Bartholomew, as a Calvinist. "Is it reasonable," asked the King, "to kill a man who by his knowledge can save a world of people?" Paré first distinguished himself by his work as an army surgeon, as he proved wounds from weapons did not require the harsh treatments hitherto used. Finding there were so few books in French on Surgery, he milked all the best extant and published in 1561 a large illustrated folio in twenty-six sections. Immensely popular, it went through thirteen editions up to 1664, and his *Opera* (1582), collected after his death by the King's surgeon-general, ran also to thirteen editions in all, in several languages.

Some very fine copper-plate work is in the *Omnia Opera* (1645), of Adrian Van den Spieghel, or Spigelius, an honored surgeon of Padua and pupil of Fabricius ab Acquapendante, and following close on this work came the carefully drawn and useful copper plates in the *Cerebri Anatome* (1664) of Thomas Willis, a celebrated London doctor. One picture shows "Willis' Circle," in the discovery of which he was aided by injecting "aqua crocata" into the brain, and Bellini's tubes in the kidneys were discovered in a similar manner.

An interesting copper plate may be seen in Christopher Volter's *Neueroffnete Hebammen-Schule oder Nützliche Unterweisung* (1679) or *Newly Opened School for Midwives*. Here, as in Rüffen and Berengarius de Carpi, one finds an attempt made to combine the useful and ornamental by making a picturesque *accouchement* showing the Cesarean section. The patient is in an elegant bed and the priest near by with a big Bible; the surgeon's assistants have on beautiful

laced coats and frilled sleeves, and the surgeon is doing the operation with his left hand. The same fault may be found in Laurent Heister's *De Chirurgia* (1718), where the assistants and accessories hinder a clear view of the operation. Heister had a world-wide reputation as a surgeon, and had many enviable chairs offered him in European universities. He had studied under Ruysch and Rau at Amsterdam, and with Albinus and Boerhaave at Leyden. It is said that he learned engraving in the interests of his profession, but does not seem to have used it in his books. It is interesting to note from the pictures the primitive instruments which were still in use and continued in use until 1800. The enema syringe figured in Heister is exactly that found in Hippocratic works—the bladder of an animal affixed to a tube.

It is a slight digression and a linking up of two men not contemporary, but interesting nevertheless, to mention the well-known piracy for his *Anatomia* (1739) by William Cowper the London surgeon. Godfrey Bidloo, of Amsterdam, had issued in 1685 his *Anatomia Corporis Humani* with 114 plates by Gerard de Lairesse and other artists, and of these, Cowper took over one hundred, adding 40 plates of his own, and enriching the whole with much-needed notes. The plates are worth studying also for their technical value. The artist often strayed into fanciful ideas from rigid anatomical facts, though Hunter says he gives most accurate representations. Bidloo studied under Albinus and Boerhaave, and was one of the most prolific writers known, some 13,000 of his writings being preserved in the library at Berne.

Another piracy was the using without acknowledgment of the plates in Gray's *Anatomy* (1849) by one Heitzmann, of Vienna, for his *Atlas* (1870), one fortunate result being that Spalteholz made his famous *Atlas* (1896) because he deemed that of Heitzmann not adequate for the student's needs.

One set of copper plates I recommend not for their instructive value, but to show how an anatomist who illustrated his own book loved to get a little humor out of dry bones. Ruysch

is the man, the book his *Thesaurus Anatomicus*, 1701. He was born in La Haye, 1638, became one of the best known of doctors, anatomists, and naturalists, and died in 1731. First he was an apothecary and instructed midwives, following Van Roonhuyze. But his chief reputation lay in dissections and a secret method of injecting. Læuwenhoeck had at this time made the microscope available, and Ruysch largely profited from it for injections and discoveries of networks of vessels. His botanical and anatomical museum was so unique that Peter the Great bought it of him for 30,000 florins, but it was partly spoiled in transit through the sailors drinking the preservative alcohol. Ruysch demonstrated the valves in lymphatics; the difference between the male and female skeleton; the bronchial arteries; the central retinal artery, and the cutaneous papillæ.

Deventer, a celebrated accoucheur of the eighteenth century, uses only the old-fashioned woodcut in his *Novum lumen Obstetricantium* (1701) but, as I said before, new books were frequently embellished with old illustrations. The woodcuts stand in strong contrast to the beautiful plates of Haller's *Anatomen Cadaveris Virilis* (1743), which were drawn by a Dr. Rollinus. Haller is too well known to need any words from me. His works fill seven columns of the *Biographie Médicale*, but perhaps he is best known by those which are the result of his experiments on living animals, from which he was able to make many important discoveries concerning the movements of the heart and on respiration.

Albinus, of Frankfurt, deserves a place in your esteem not only for the beautiful work in his *Tabulæ Sceleti et Musculorum Corporis Humani* (1747), of which Haller said: "There was nothing better or more perfect in Anatomy to be found," but for his generous care in editing and reëditing the works of other surgeons from a desire to preserve the fine illustrative work. Vesalius, Eustachius, Harvey, Cowper, and many others are his debtors. The plates in his own work are by three

artists, whose work he carefully supervised. Comparative Anatomy was his favorite study, and no one up to that time had equalled the delicacy and beauty of his dissections and injections. After Albinus, you should study Pierre Camper's own drawings in his *Anatomico-pathologicarum* (1760), for the excellence of which he accords full praise to his engraver, Schley. Camper was Professor of Anatomy and Surgery in Amsterdam, and later Professor in Grommigen of Medicine and Surgery. It was he who discovered pneumatic bones in birds. Paleontology and mineralogy were also favorite subjects, and many treatises on medicolegal subjects came from his pen. Illustrations at this period were the best of their kind, and many an author went far beyond his means in paying artists. Cheselden, court physician under George III, had the Dutch artist Vandergucht to illustrate his folio *Osteographia* (1733), in which the bones are lifesize and the ends expressed by single lines to show their smoothness.

The open free style in which these plates are etched and engraved, and the inimitable manner of expressing the different textures of the parts, show a great artist. Shinevoet, another artist, also helped, but Cheselden himself helped both with pencil and needle, and all three used a camera obscura designed by Cheselden, "throwing away many drawings which had been approved of," he says. Three volumes were intended, and early (unsolicited) subscribers were promised the volumes at four guineas and an assurance that not more than 300 copies should be issued and the plates destroyed. Cheselden lost money over the first volume, and the other two never appeared. Those who are fortunate enough to possess one of the 300 have a fine specimen of printing, paper, and engraving, which might, for its beauty, have come from the celebrated Baskerville Press. Our own Dr. Cadwalader studied in London under Cheselden, and on his return to America lectured in Philadelphia on Osteology.

As a worthy follower of Cheselden I took down Antoine Scarpa's huge folio on *Aneurisms* (1747), and would advise you to note carefully the difference between the two styles—the long flowing lines instead of the short etched ones. These plates are Camper's own; his engraver, one Anderloni. Those which show the cardiac nerves, hernias, and aneurisms may still be reckoned as the most perfect extant. In 1820 Dr. John D. Godman, a celebrated anatomist of Philadelphia, translated this work.

Along the same road of disinterested solicitude for students and science comes William Hunter, who, not wealthy, had the best artists in Europe to illustrate his *Anatomia Uteri Humani Gravidi* (1774). "Sir Robert Strange himself," says Hunter, "the grandest engraver of flesh who ever lived, directed all and gave immortality to two of the plates." This Strange was at first apprentice to an engraver, but rose so rapidly that, after studying under some of the best masters of the craft abroad, he became the first of British line engravers, and was eventually knighted. Van Rymsdyk, who made most of the drawings, was employed for £200 by our own Dr. William Shippen to make crayon drawings of the human body and gravid uterus for the hall of Pennsylvania University. Hunter's folio is a masterpiece, for it comes from the Baskerville Press, and was the only medical work they issued. This firm owed its reputation to its scholarly accuracy and wonderful type, ink, and paper. To secure letters which pleased him for a book, Baskerville once spent £500 and three years in experimentation. "I went to this expense," writes Hunter, "because one of Mr. Baskerville's pages forms an excellent preservative of the drawing."

Mascagni was another who sought good artists, and the one he chose for his *Vasorum Lymphaticorum Corporis Humani* (1787), Cyrus Sanctius, has put a marvellous amount of work into fine copper plates, the first part of which book shows the lymphatic vessels; the second, the organs themselves. Mascagni's sons, issuing *The Conclusion* of this work

in 1816, after their father's death, were equally careful about the illustrations, and had the services of Antoine Serantoni and Augustine Costa. Mascagni himself, one of the greatest anatomists, took the chair of anatomy in Sienna when only twenty-two years of age, and devoted himself to microscopic work on the lymphatic system.

It is not often that two arts, of surgery and drawing, are equally possessed by two brothers; therefore the *Principles of Surgery*, John Bell (1806), and the *Anatomy of Expression*, Charles Bell (1806), have a peculiar interest with their most careful and beautiful copper plates. These two surgeons considered their sketch books as much a part of their equipment as any other necessary instrument, and constantly urged the use of the pencil on the students. Let me read you a word or two from John Bell:

"To think with accuracy, I found it necessary to think with my pen or my pencil in my hand; with these I resolved, to my own satisfaction, every surgical problem, and soon I found that my command of facts accumulated, that my general knowledge improved, that my resources were expanded, that no case occurred without having its precedents to serve as a rule for my conduct, without analogous facts to give it importance. If it be presumptuous in a painter to draw a likeness from memory, what must it be for a surgeon to trust to recollection for those signs which are to warn him of approaching danger, or for those descriptions of disease, those marks of parts which are to direct him in operating? I never yet attended the poorest creature in a hospital without taking an interest in his distress and usually a drawing of his disease. My conscience dictated to me that in matters of life and death accuracy should not be a fault. The young surgeon who has made this his study is no sooner engaged in practice than he becomes conscious of the superiority it gives him."

Colored lithographs came in in the early part of the last century; they were, of course, rough compared with the modern ones, which were good even in 1825, as you may see by

noting those in Goddard's *History of the Nerves* (1825) and Charcot's *Lectures on Bright's Disease* (1878). But some of the finest are in Richard Quain's *Anatomy of the Arteries* (1844). These plates were the result of some 930 dissections by the author, and were engraved on stone by Joseph McClise, a London surgeon. I showed you a copy of the work done by Bell. Henlé, too, one of the greatest leaders in the anatomical world, illustrated, and illustrated well, his *Surgery*, which appeared in 1871. McClelland, of Philadelphia, photographed and saw through the press the dissections in his large and ambitious *Anatomy*, which is such a faithful objective of the subject. Some of you know well the exquisite illustrations Joseph Leidy made for his *Anatomy* and the beautiful colored plates in his *Fresh Water Rhizopods of South America* (1889), which came out during my student days and greatly excited the pupils of Pennsylvania University, where he was teaching practical Anatomy from week to week. You should get also a glimpse of Theodore Wormley's *Microchemistry of the Poisons*, for which all the ninety-six delicate drawings were executed by his wife, a similar admirable work being done by the wife of Dr. Simon, my fellow-townsman, in his volume, *Diagnosis*. One of my own residents, Dr. Sampson, now Professor of Gynecology in the Medical School, Albany, has published a Gynecology on a novel plan entirely illustrated by himself in strikingly clear outline drawings in black and white. I would that one man were with us tonight to tell of his own inspiring work in the gynecological field, Dr. Robert L. Dickinson, of Brooklyn, a man who, born with an artistic taste, has cultivated his powers of expression in this field to an extraordinary degree, and I must couple with his name that of Dr. Harvey Cushing, of the Johns Hopkins Hospital, some of whose remarkable illustrative work I gladly show you. A well-merited tribute of appreciation is also due to three men—Max Brödel, August Horn, and Hermann Becker—who left their country and people and are raising up a little school of anatomical artists

in America, a work with which every doctor and every student ought to be in entire sympathy.

What practical conclusions may we now draw from this little excursus into the field of art and medicine? (1) I think that we will agree that art is an indispensable handmaid to medicine. (2) That the time has come when good artists can and must be had for all high-grade medical work; and (3) that from now on we shall insist that all works which we buy, susceptible of illustration, shall be illustrated, and illustrated in the best possible manner. We want illustrations henceforth of a uniformly good quality, well executed and accurate. The illustration must elucidate the text wherever it is possible, nay more, the illustration may often render some of the text superfluous. We need, in addition, some books from time to time made up almost exclusively of illustrations, with only the requisite amount of text. We must encourage artists to enter this field by duly appreciating and remunerating their labors. This is a far nobler field for artists than undisciplined attempts to teach themselves by copying pictures and by making crude sketches from nature, and, above all, by daubing china and silks and satins with gross caricatures which, instead of elevating, destroy the artistic sense.

No artist can do our medical work well who does not discipline himself by years of arduous labor in the dissecting room and by the operating table, and who does not with the artistic cultivate the scientific spirit. As a practical step, let me urge that this society shall at once take a definite stand in this matter by carefully scrutinizing all medical books submitted to their attention from now on, and if the illustrations are poor, freely criticise and refuse to buy the works. Insist that the standard of the illustrations shall at least measure up to the price of the book, which is invariably high. A general call for good work after this fashion would shake every publishing house in the land within three months' time.

You must then resolve each one of you to become, according to the measure of your ability, an art critic.

I desire, however, to insist upon more than this, namely, that our physicians and surgeons everywhere shall become themselves productive in the field of medical art.

First and foremost, do your best to draw your cases, making outlines, however crude, and register with the pencil in marks, however crude, what you see in any given interesting case susceptible of illustration.

This will at once quicken your interest in your work and teach you to observe more minutely and more accurately, and, following this, your sketch work will insensibly improve. At a later date you may find these little crude sketches speak to you of your case in a more positive language than your elaborate verbal notes.

I want to insist that drawing shall be taught in all our medical schools, and that no student shall graduate who has not made at least a number of rough sketches of specimens and cases in a note book.

Of late years photography, and particularly stereoscopy, has put it within our reach to record rapidly and accurately all changes of the form of the body, and a great variety of lesions of the integument. And this is a method of case recording I specially desire to commend to your attention today. In photography we have a field which can be occupied at once by one who has no experience, while at the same time it affords an absorbing occupation to the brightest talents of the veteran of many decades, so simple and yet so deep and so intricate is this absorbing branch. The apparatus need not be expensive; a $25 camera, or even one for $15, will give excellent results; on the other hand, you may spend hundreds if you become deeply absorbed in it. You need do nothing more than make the exposure and take the picture, or you may find it a source of your greatest delight to develop and fix, to enlarge and to make prints for filing and lantern and stereoscopic slides, and in this connection I hope to publish shortly a little practical volume on what has and what can be done to illustrate cases, lectures, and medical works.

FIG. 1.—Woodcut from the Ars Moriendi (early part of fifteenth century).

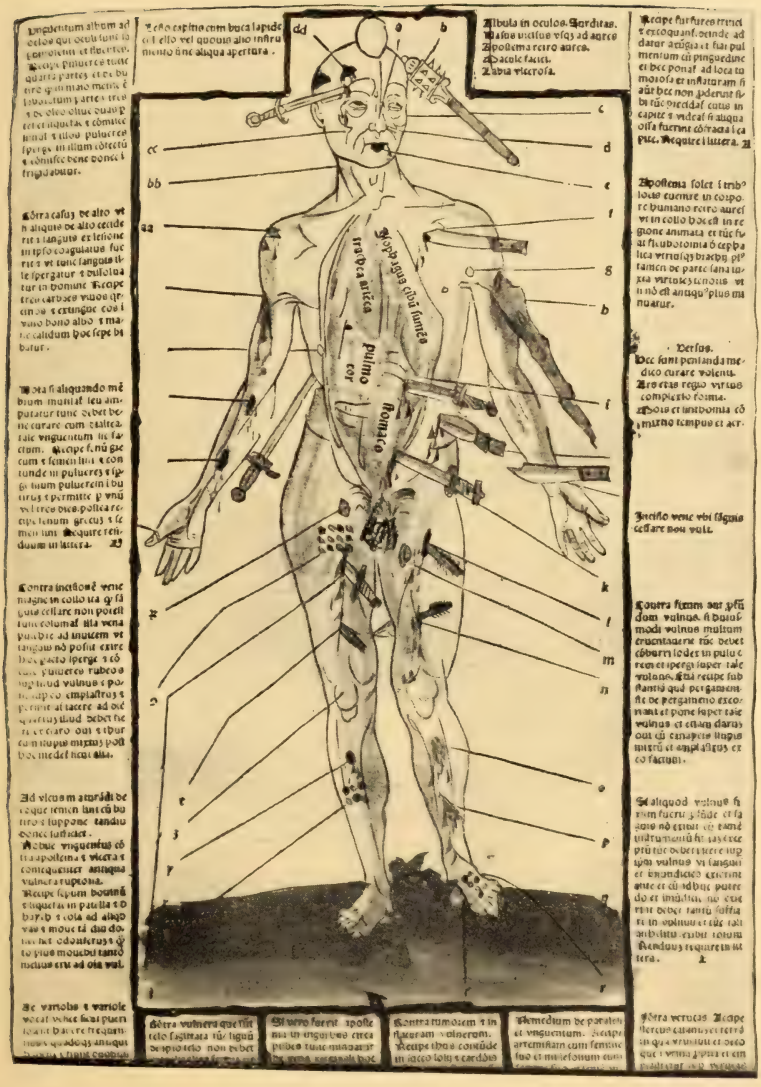

Vngentum album ad oculos qui oculum tumefactum et rubeum.
Recipe pulueris ceruse quarte partes tres bubule quam maxime recentis fimi partes tres vitelli ouorum .v. partes duas pimenti partes duas pulueres simul et misce et cum eisdem ipergas et illinias oculum.
Contra casum de alto vel aliquo de alto cadentes super sanguinem effusum in pectore coagulatum faciens vt tunc sanguis ille ipergatur et diffusa in corpore.
Recipe trium herbarum vulnerariarum .i. consolide .i. centaurie .i. cordialis vnum bonum album et mastice album hoc sepe balatur.
Nota si aliquando membrum mutilat seu amputatur tunc debet hec curare cum scalteratione.
Recipe fimi gallini et femen lini et confunde in pulueres et ipergatum pulueres in buccas et permitte per vnum vel tres dies pollicem recipe linum grecum et simul misce.
Contra incisionem venemagnam in collo ita quod sanguis cessare non potest tunc columat illa vena vsque ad inuicem vt sanguis non possit exire.
Recipe fimum bubulum et pone super vulnus et ligato vulnus et pone super eo emplastrum et permitte stare ad octo quindecim diebus et tunc debet tu recedere caro cum vulnere cum magna materia et bona.
Ad vlcera maligna de capite semen lini cum bubulis fimis pone tandiu donec sanet.
Adhuc vinguentum contra apostema et vlcera et quemcunque antiquum vulnus et ruptum.
Recipe fimum bubulum et aquam in patella et boyla et cola ad aliquantum et move tu duo donec sit odoriferus et tu potes mouere tamen nichil cessa ad ora vsq.
De varolas et variole vocat vobis sint pueri debent habere frequentius quoddam antiquum
Petro capino cum buca lapidea vel ello vel quouis alio instrumento sine aliqua apertura.
Albula in oculos. Sardinus. Vasus vitreus vasis ad aures. Apostema retro aures. Scale facies. Labia viciosa.
Recipe fur furis et tritet et coquant simile ad dargar zengiar et sic pulmentum cu pinguedine et hec ponat ad loca tumorosa et inflatura et si fur hec non iuerint si hec coquat cum in capite et videat si aliqua ossa fuerint corrupta loca pue. Require in littera.
Apostema solet fieri bubo lous euenire in corpore humano retro aures vt in collo bocell in regione animata et tuc si fiat phlebotomia ꝯ cephalica vel ramis brachy. plus tamen de parte lesa in tuxia varioles sanguis vt in nō est antiquus plus minuatur.
Versus.
Hec sunt pendanda medico curare volenti.
Zero eras regio virtuo completo roma.
Bolus et antidota cū mirro tempus et aer.
Incisio vene vbi signis cessare non valet.
Quero fimum aut pilidom vulnus si hoc modi vulnus multum cruentauerit tuc debet cōburri lodes in pulueres et ipergi super tale vulnus. Si vis recipe sub stantia qua pergamenti fit de pergameno excoriant et pone super tale vulnus et etiam dari ouum cū canapem linum mistū et emplastrus ex eo factum.
Si aliquod vulnus fuerit facta phisice cessatio nō erunt ei eque vulnerum sit sayere prius tuc debet tere cum ipsum vulnus vt sanguis et ennodicos existimare et cū hoc puere debet medicus nō cessare debet tamen cessatio et in vulnere tuc tali ambitu caute totum faciendus require in littera.
Contra vulnera que fiunt tele sagitta. Si tuc ligni de spiculo non debet
Si vero fuerit apostema in inguine vel circa pubes tunc magnam
Contra tumorem et inflaturam vene. Recipe ibus consolide in aceto lota et cardus
Remedium de paralesi et vinguentum. Recipe artemisiam cum semine
Contra variolas Recipe hercules cum vermes et herbam in qua vermiculi et oua que vermes pone et cum

FIG. 2.—Woodcut from the Fasiculus Medicinae of John Ketham, 1491.

FIG. 3.—Woodcut from the Fasiculus Medicinae of John Ketham, 1491.

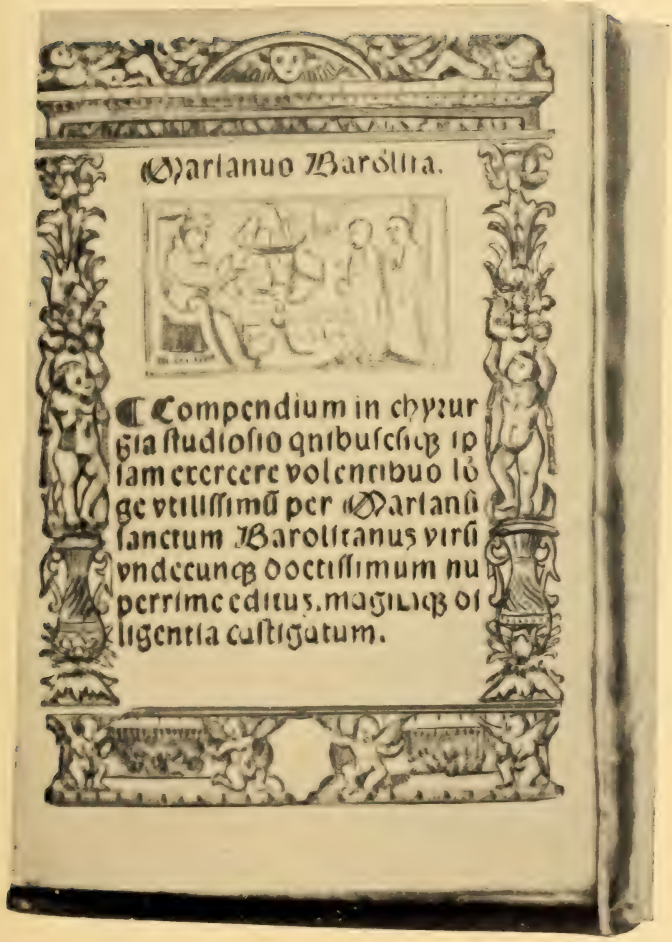
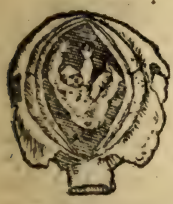


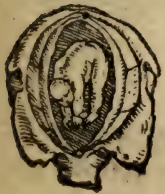
FIG. 4.—Woodcut from the Compendium in Chyrurgia of Marianus Sanctus, 1530.

Fig. 5. Woodcut from Symmetry of the Human Body, Albrecht Dürer, 1528.



pacto in foribus appa-
at. Debet obstetrix in-
rere manus, ac partē su-
mouere, donec in pu-
procidat, atque ita de-
de exeunt. m excipere.
Quanquam satius mul-
esset, si fieri posset, hoc
co ita partum submou-
ut non in pedes, sed in caput conuerteretur, na-
ralitq; modo egereretur.

Item, si partus
flexa ceruice exhib-
ret se, ut hic deping-
des, necesse erit re-
submouere humer-
& leuiter caput
loco restituere.
Hoc secus agendū
si fortè in pectus pro-
deret partus, aut
so uultu exitum peta-



Item, si partus ita
cideret, ut simul pedi-
ac manibus sese deiec-
quale in figura pre-
uidere est, tamen obst-
cem decet apprehe-

pite, pedes in sublime reuocare, & ita ad exitum deducere.

Contrà si in pectus procideret partus, retentis simul ac discriminatis intus pedibus ac manibus, quale est quod hic depingitur, tamen insertis molliter digitis, in latere parietis per obstetricem, partus muertendus est. Quòd si totam manum inserere posit, tum ita gubernandus & regendus partus erit, ut qua pars foribus propior, & ad egerendum aptior fuerit, ea comprehensa, ad exitum protrahatur: quanquam, si in capite cōuerti partus posset, multò id tutissimum foret.

Iam si eueniat, ut partus simplex aut unus non sit, sed gemini, ijq; simul se ostendant: Si id quidem capite, obstetricem oportet alterum, post alterum, ita tamen ut posteriorem a manibus non emittat, & priorem ut est, conse-
est, deducere.

FIG. 6.—Woodcut from the Byrth of Mankynde, Raynalde, 1545. A translation, with notes, of De Partu Hominis, Rhodion, 1513.

FIG. 7.—Woodcut from De Humani Corporis Fabrica, Vesalius, 1543.

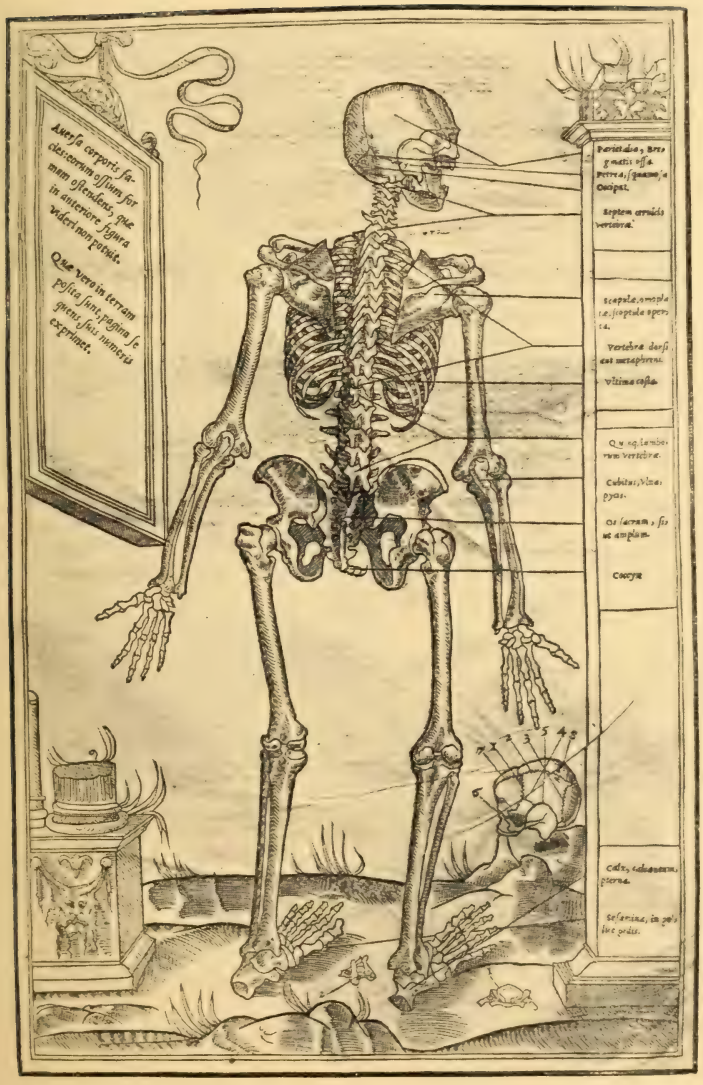

Auersa corporis formam ostendens, quæ in anteriore figura videri non potuit.
Quæ vero in terram posita sunt, pagina sequenti, suis numeris exprimit.
Septem cervicis vertebræ.
Scapulæ, omoplatæ, scapulæ spectatæ.
Vertebræ dorsi cui metaphrenon.
Vltima costa.
Cubitus, Vlna, pyga.
Os sacrum, sive amplum.
Coccyx
Coxæ, ischiadem, pectines.
Femora, in poplite genu.

FIG. 8.—Woodcut from De Dissectione Partium Corporis Humani, Stephanus (Estienne), 1545.

FIG. 9.—Woodcut from De Conceptu et Generatione Hominis, Ruffen, 1554.

FIG. 10.—Woodcut from the Anatomia, Valverda, 1560.

FIG. 11.—Copperplate from the Newly Opened School for Midwives, Voltern, 1679.

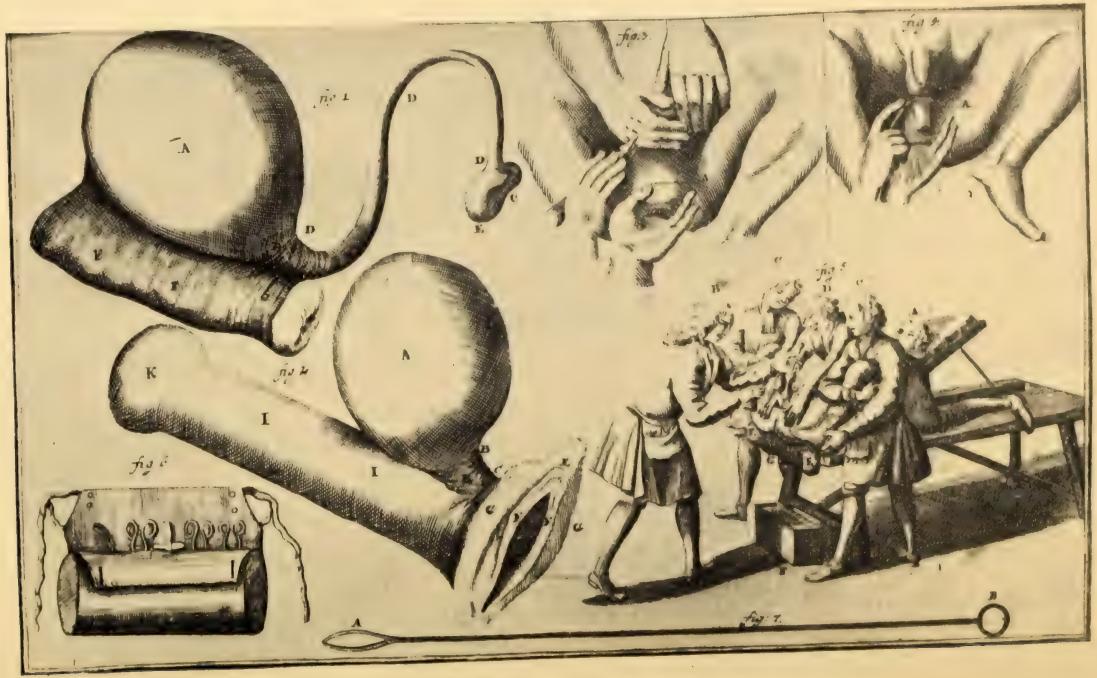


FIG. 12.—Copperplate from the Chirurgie, Heister, 1718.

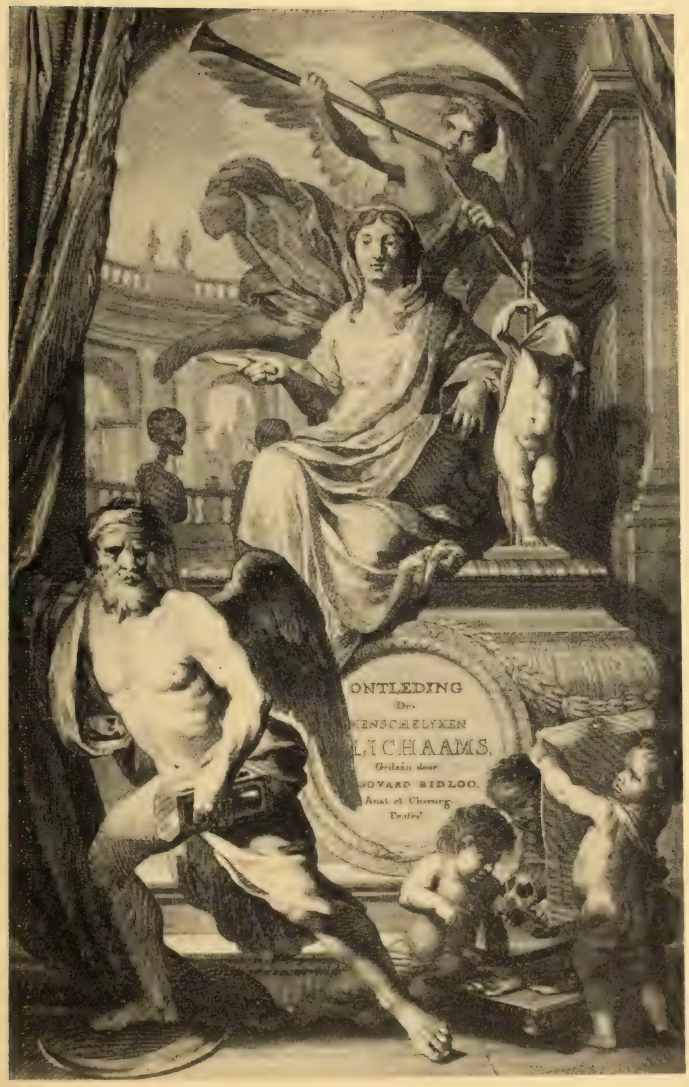


FIG. 13.— Copperplate from the Anatomy, Bidloo, 1685.

FIG. 14.—The same copperplate in the Anatomy, Cowper, 1697.

FIG. 15.—Copperplate from the Thesaurus Anatomicus, Ruysch, 1701.

Fig. 16.—Woodcut from the New Light for Obstetricians and Midwives, Deventer, 1701.

FIG. 17.—Steel engraving from the Anatomia Uteri Humani Gravidi, Hunter, 1774.

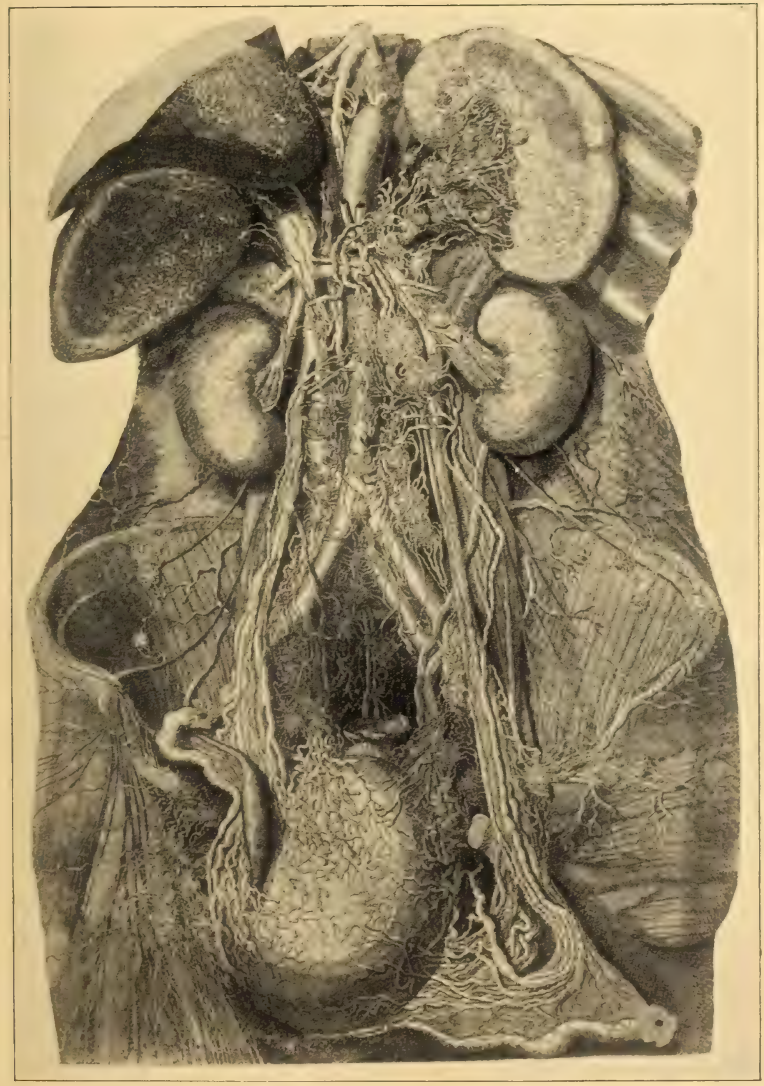


FIG. 18.—Copperplate from Vasorum Lymphaticorum, Mascagni, 1787.

FIG. 19.—Colored lithograph from Anatomy of the Arteries, Quain, 1844.

THE POSTOPERATIVE COMPLICATIONS IN ABDOMINAL SURGERY.

By C. M. Rosser, M.D.,
Dallas, Texas.

The purpose of this paper is to consider the untoward conditions which with more or less frequency supervene, and we must include those incidents, accidents, and errors which, occurring beforehand, render possible postoperative complications relatively probable.

It is, I think, a common experience that as surgeons progress in precision and proficiency they are less likely to leave out of statistical records other facts than mortality, for it becomes evident that except in emergency service and that wherein a desperate pathology approaches that line, clear judgment, improved facilities, and trained technique should reasonably insure against all but accidental death.

When, therefore, we estimate the merits of individual procedures and the methods of any particular operator, the inquiries should be: (1) The length of disability, (2) the relief obtained for symptoms requiring the surgery, (3) the probable permanency of the relief, and (4) whether new troubles have developed.

Confinement to bed and detention in hospital, when unduly prolonged, is not alone of commercial consequence. Some interesting figures have been tabulated showing an enormous waste of time under less accurate arrangement, and without citing them in detail we have but to think of the many thous-

and surgical cases cared for each day, and the importance from this standpoint is sufficiently impressed.

The scientific aspect, if less apparent, is still of more concern.

As the general average of time from home is shortened, hospital help will advance in favor. Such a change in sentiment will secure benefits of which those personal to an increased number of patients are of prime value. Neither is the matter of mental contentment to be ignored as a factor for the relief of physical infirmity, influencing, as it does through confidence, sometimes even final results.

Presupposing, as all procedures do, that pain and other invalid states are to be followed by a return approximating the normal, a failure in these particulars brings not only a disappointment to the immediately interested, but discredit to the science itself, and this is inevitably true when for any reason an original distress is exaggerated, or when one which could be borne is exchanged for a disorder more prostrating and intolerable. We shall, therefore, consider those factors which prolong invalidism and render end results uncertain.

Nausea and Vomiting. Some degree of nausea, usually accompanied by vomiting cannot always be avoided. Correct preparation of the alimentary tract through rest and cleansing, and the least possible disturbance of patient after anesthetic is begun, a dispatch in concluding work which is still short of haste, are means which, if failing to prevent their occurrence, will mitigate a severity of the symptoms.

Patients who object to entering the operating-room while they are awake, will generally, if informed, prefer that simple excitement to the distress of "seasickness" and the increased operative time consequent to removal from an adjoining room. However, as stated, the condition is without constant control. The physiological depression to the nervous system produced by chloroform and by ether to a less degree, an accumulation of stomach contents with ingested mucoid secretion, must give more or less systematic offence, but by

keeping in mind the causes mentioned the remedy is reasonable.

Restored oxygen rapidly displaces the inhaled ether and re-establishes nerve tone. If nausea is but slight and other precautions permit, a semi-sitting posture and a moderate draught of hot water will encourage drainage of the stomach through peristalsis aided by gravitation. At times turning prone anteriorly may accomplish the same results. These failing, if the situation is one in which thorough emesis would not be a hazard, this may be induced by giving warm water freely, or, if thought safer, a stomach tube may be promptly employed, the choice being before return of consciousness, if its necessity can be anticipated.

Hemorrhage, Shock, and Collapse, somewhat similar in general expression, and having a more or less definite relation may be studied together, the first, most important as a factor in producing the second, and the second a sometimes unfortunate forerunner of the third.

Leaving out of the question as unsurgical and anomalous, sufferers from chromic enemia and bleeders, our better mechanical skill has minimized the primary risk and practical asepsis has rendered secondary hemorrhage very infrequent.

When trivial, whether the leak is arterial, venous, or capillary, resort to position and pressure will be sufficient, but if coagulæ are collecting in cavities sufficiently extensive to render absorption difficult, or in separation of structures that should unite, their removal is wise; and if extremis is imminent, prompt search to secure the bleeding point is imperative.

Drugs, as ordinarily employed in hemorrhagic states, are not only valueless, but are of positive injury.

These include strychnine, digitalis, ergot, alcohol, and later adrenalin, all of which act by increasing cardiac impulse, and, therefore, arterial tension.

Opium salts, preferably morphine, hypodermatically, by acting contrawise serves a good and sometimes, in even serious conditions, a successful purpose.

It not only lowers arterial tension without depressing unduly the vital forces, but by relieving pain and reflex disturbances, anticipates the condition of surgical shock, which, next to immediate exsanguination, is most to be feared.

As a preliminary to the same possible necessity saline solutions, as variously employed, may be used, but not until bleeding apertures are under control. For this purpose the pack, torsion, and ligature are successful when properly applied.

Whether shock is due to cardiac weakness per se or independent of heart conditions, or a disturbance of the vasoconstrictor centre, or both, the clinical picture and indications are more positive than its complete etiology.

It is well, however, to keep in mind that hemorrhage, profound and prolonged anesthesia, exposure of viscera and pain produced by marked trauma, especially when the insult is offered to an extensive perifera, are known causes. While not as clearly shown, physical depression we term "surgical shock" may be rendered all the more easily produced in patients in which there is a reaction from mental excitement. Nothing is more conservative as an adjunct to cure, than a maintenance of confidence or lack of fear—a converse condition always opposing a favorable result. As shown by the brilliant experiments of Crile and other original workers in this field, we cannot hope to restore a normal equilibrium by way of the medicinal methods, but recently so popular. Strychnine, which will promptly stimulate a normal heart, is powerless to correct the condition of central exhaustion when due to functional inhibition, or to compensate for a loss in circulating current.

The same is true of alcohol, which, in addition to being useless, actually adds to the embarrassment by its secondary effect.

It is only in conditions of profound anemia that the head should be distinctly lowered. In such cases the desire to

secure an increase in cerebral circulation suggests this plan, but otherwise a venous stasis will add to the phenomena.

The pneumatic rubber suit, recommended by Crile and Dawbarn, is a logical mechanism for limiting circulatory necessity and may be applied either in anticipation or as a treatment later on.

Morphine, by obtunding peripheral and other distress, acts as a balance to flagging forces and adrenalin, by improving blood-pressure throughout the system, are the two agents which are entitled to a place in professional confidence.

In addition to these agencies, saline solutions, by adding volume to the circulation, may be employed in manner and quantity according to judgment in individual cases. Under emergency, as after serious hemorrhage intravenous injection or hypodermoclysis will be preferred, but where practical after consideration of time, I believe its introduction to the colon by slow irrigation the most promising way. In this manner, while temporarily reducing the quality of blood standard, its quantity is either exaggerated or restored, and at the same time the thermal influence upon nerve reflexes is not an unimportant point in the general plan.

Postoperative or Inhalation Pneumonia is an extreme incident which is rarely observed. Unsafe exposure, under conditions of lowered vitality, may in instances account for its occurrence, and, as the imprudence involved is contrary to the safety of the patient, exclusive of this possibility, there is no excuse for permitting it, but the most likely explanation lies in the known fact that pneumococci are found normally in the upper respiratory tract, and that anesthetic vapors by chemical irritation invite an otherwise delayed invasion. This theory suggests antiseptic care of the mouth and pharynx as a preliminary measure, and less liberality in the use of the anesthetic agent. Lung complications also occasionally take the form of bronchitis or pleurisy.

Hypostatic pneumonias are far less frequent since we have

learned that the prone position and persistent decubitus is not the best general habit.

The most serious involvement is that from the metastasis during the process of septicemia. In such cases the infective course is not self limited as is the case from bacterial causes, and its gravity is that which is always true of alcohol manifestation of general disorder. Symptoms will vary in type and severity according to the conditions mentioned. In the absence of an inhaled foreign body or general sepsis the prognosis is not more unfavorable than when of idiopathic origin. There is nothing essentially different in the treatment from that suitable to other cases, except that the primary or surgical conditions must at all times be taken into account. Recognizing the opportunity for the implantation of sepsis in all cases, care is taken to conduct a system of elimination in the most effective possible manner from the beginning. For this purpose excretions from the bowels and skin are maintained, guarded by the heart and respiratory stimulants.

Included in this method may be mentioned the hot pack and irritating bath, which, by dilating the capillaries and the peripheral arterioles, relieve pulmonary stasis and in this way protects the heart against a threatened exhaustion. As in shock, so here colon flushing is of pronounced importance. That part which is returned is accompanied by excreta containing toxic elements, while that which is absorbed acts as a dilutant to the poisoned blood until eliminated conservatively through the skin and kidneys.

Probably the most generally dreaded surgical sequel is postperitonitis. Occurring but seldom and rarely without traceable reason, its development is noted with surprise and ofttimes resentment on the part of watchers, and brings keen regret, if not remorse, to him in whose service the misfortune is found.

This suggestion, of course, relates to clean cases and to those in which well-directed drainage and a satisfactory perspective indicated that poor conditions had been turned into better ones.

In the treatment of profound septic states, any given plan of treatment is likely to be attended with results which cause a regret that some other was not chosen, but early recognition and prompt action will very often save life.

If the ordinary methods do not limit a spread of the infection, pernicious vomiting, pseudo-ileus, gaseous distention, and a train of distressing symptoms quickly follow. The few methods other than operative, which have established credit, should be promptly employed. Stomach lavage, enemata of turpentine emulsified by egg in normal saline, when thrown into the high bowel, promote comfort by relieving distention.

In conditions of apparent obstruction due to paresis and reverse peristalsis, an injection of an alum solution into the rectum, as advocated before this body by the lamented Hardin, of Atlanta, will, in suitable cases, be of pronounced effect. This method is superior to glycerin when employed for the same purpose, both in certainty and safety as well.

When, in the well-considered judgment of an experienced surgeon, reopening the abdomen in search of pus pocket, obstruction, inflammatory adhesions, perforations, or peritoneal drainage, the greatest care will be required. Unless imperative a general anesthetic should be avoided, and if ether is used the amount should be carefully guarded. It will generally be safer to rely upon local anesthesia for the limited surgery admissible in such extreme conditions.

Purgatives, and even laxatives, are to be avoided on account of the distress and danger inevitably to follow, but prompt recognition of obstruction from any cause so necessary that its absence must be constantly demonstrated by other methods. When the presence of progressive pus can be reasonably determined, and when obstruction is known to exist whether from ileus or adhesions, a prompt surgical interference, while a dernier resort, is the only alternative.

The limits of propriety prevent a mention of other not less important complications, which are seen less often and about which there is still much uncertainty. Of these acute dilatation of the stomach is probably of rather frequent occurrence.

SOME POSTOPERATIVE COMPLICATIONS OF PERITONITIS.

By Randolph Winslow, A.M., M.D.,
Baltimore.

One of the most notable advances in surgery, of the past few years, has been the treatment of suppurative peritonitis by the postural method, with drainage of the pelvic cavity. By this method a condition that was formerly followed by an enormous mortality has now been robbed of most of its terrors, and recovery after suppuration within the peritoneal sac is the rule rather than the exception. It is not my intention to discuss the treatment of acute suppurative peritonitis, but to call attention to some of the complications following operations in this condition, and to invite discussion as to the manner in which they may be prevented. An inherent tendency in peritoneal irritation and inflammation is the production of plastic exudate, in greater or less quantity, upon the surfaces of the intestines, by means of which they become adherent to each other, or to some contiguous structure, and causing in not a few instances an angulation of the gut or a narrowing of its lumen to such a degree that intestinal obstruction is set up, with its dire train of symptoms and its frequently fatal result. The unfortunate patient escapes Scilla indeed, but only to be wrecked upon the jagged rocks of Charybdis. When the abdominal cavity is opened and the viscera are handled an additional traumatism is inflicted, and when tubes or gauze are placed within the peri-

toneal sac adhesions to a certain extent must occur. Fortunately these adhesions are not generally followed by bad results, but in the exceptional case serious complications occur. Intestinal obstruction is then the most frequent complication of peritonitis, whether due to the original infection, to the traumatism of the operation, or to the irritation of foreign bodies introduced for drainage, or to intestinal paresis from sepsis. Intestinal paresis is a potent cause of obstruction, but is one that precedes rather than follows operations for the relief of peritonitis. Postoperative obstruction is generally due to adhesions causing angulations or kinks in the gut, more frequently than actual coarctation of its lumen. The patient, who has been doing well, is suddenly seized with cutting pains, tympanites and vomiting, and with an arrest of the downward passage of flatus and feces. When the abdomen is opened there will usually be found adhesions of the intestines at one or more points, sometimes slight in character and easily separated, at other times very extensive and detached with great difficulty, often leaving raw surfaces which it may be impossible to cover with peritoneum. Whilst in some cases there may be an actual constriction by a band with consequent strangulation, generally the bowel is distended and kinked, and the greater the distention the more acute is the kink. These adhesions may be due to the original infection, but are undoubtedly often provoked by the use of gauze and tubes for drainage. Again, is it not probable that the Fowler position favors adhesions and obstruction, by causing too great a descensus of the intestines into the pelvic cavity? We indeed cure our patients of the peritonitis, but have them die of obstruction, or save them by another operation, so as by fire. How can we prevent obstruction in these cases? In my opinion, by handling the intestines as little as possible, by removing or repairing the original focus of infection, as a ruptured appendix or perforated viscus, and by avoiding the use of gauze in the peritoneal cavity, unless it is enclosed in tubes or rubber pro-

tective, and by removing the drains in a shorter time than has been customary with some of us. The acutely inclined posture is invaluable and cannot be dispensed with, but I am inclined to think that it may be maintained for an unnecessarily long time, and that adhesions of the intestines will be lessened if the patient is placed in the horizontal position at an early rather than a late period. Intestinal paresis favors adhesions, hence peristalsis should be encouraged by the use of appropriate measures as soon as the acuteness of the peritoneal inflammation has subsided. Intestinal peristalsis tends to prevent or limit the formation of adhesions, and to cause their attenuation or disappearance after they have formed.

I wish also to call attention to the danger of using large glass or rubber tubes within the abdominal cavity. In one personal case the small intestine in some manner became incarcerated in a large "lamp-chimney" tube, causing a genuine strangulated hernia within the tube. This I was fortunately able to release and the patient recovered, but the same accident happened in the hands of a colleague with a fatal result. Perforated tubes are also dangerous, if the fenestræ are large, as there is danger of prolapse of the intestine through these openings, especially if the tube is of large caliber. This accident happened to me in one case; the small intestine passing through two lateral fenestræ into a large-sized rubber tube, and, though released, an intestinal obstruction resulted, from the effects of which the patient died.

I think two or more moderate-sized rubber drainage tubes split or cut spirally and filled with gauze, and carried to the bottom of the pelvis, are preferable to the rigid glass tubes of large size; or wicks of gauze of any desired size, covered with rubber protective may be used. One of my colleagues uses a condom with the end cut off and filled with gauze, and finds it very efficacious for pelvic drainage.

Of course there are many other postoperative complications

of peritonitis, such as vomiting, tympanites, obstipation and pain, which are usually due to paresis from sepsis, or to obstruction from adhesions; in the first case, requiring gastric lavage, and rectal instillation of large quantities of salt solution, and possibly enterotomy; in the latter event, an early and intelligent interpretation of the symptoms, and the release of the adhesions, or if this is impossible or inadvisable the performance of an enterostomy or anastomosis to sidetrack the obstructed area.

When the adhesions are extensive it will be better in some cases not to attempt to separate them, as this is often followed by profound shock and frequently by a recurrence of the obstruction, but perform at once an anastomosis with a contiguous portion of the intestinal tract below the obstruction, or make a temporary fistula with drainage externally. Fecal fistula may also result from pressure of the drainage tube, or from necrosis of the bowel wall from obstruction of the circulation, and will require appropriate treatment; excision and suture of the opening, or resection of a portion of the gut with enterorrhaphy. In one case detailed herewith, gangrene of a considerable area of the abdominal wall occurred, probably from an infection from an enterotomy. In exemplication of the foregoing remarks, I beg to append a brief history of two cases that have occurred recently in my hands:

Case I.—*Appendicitis and peritonitis followed by intestinal obstruction from adhesions; operation; cure.* M. P., a fine, healthy-looking girl, aged twenty years, was admitted to University Hospital, June 25, 1907. Five days previously she was taken with acute pain in the right side, soon extending over the entire abdomen, attended with nausea and vomiting. When admitted she had an evident appendicitis with peritonitis, and was at once subjected to laparotomy, a vertical incision being made through the right rectus muscle. The appendix was ruptured and gangrenous, and a large quantity of foul, greenish yellow, purulent fluid was found free in the peritoneal cavity. The appendix was removed and two

split tubes filled with gauze were introduced into the pelvis, and a small quantity of unprotected gauze was also placed between the tubes. An examination of the pus showed it to contain streptococci in abundance. She was placed in the Fowler posture with the head of the bed acutely elevated, the stomach washed out, and rectal instillation practised. At first she was very ill, but at the end of forty-eight hours there was a marked amelioration of her condition, and she made a satisfactory recovery and was discharged on August 10. She remained well four weeks when she was taken with cramps in the belly, vomiting, and inability to pass flatus or feces. She was readmitted to the hospital on September 6 and immediate laparotomy done. There were some adhesions of the small intestine which were tied off and divided, and she made a good recovery.

Case II.—*Appendicitis and peritonitis, followed by extensive adhesions, causing intestinal obstruction; enterostomy, followed by anastomosis and, subsequently, by resection and enterorrhaphy.* C. M., white, male, aged nineteen years, was admitted to University Hospital on August 5, 1907. He was a healthy young man, an ironworker by trade. On July 29 he was taken with cramps all over his abdomen, with tenderness, nausea, and vomiting. He did not enter the hospital until a week later, when he had a markedly distended and rigid abdomen especially in the appendical area, but without vomiting; temperature, 99°; pulse, 78; respiration, 28; ice bags were applied and pain ceased. He was operated on August 8 under ether. An incision through the right rectus muscle revealed an extensive peritonitis with exudate on the intestines, and a large purulent collection in the peritoneal and pelvic cavity. The appendix was gangrenous and ruptured, and was removed, the pus partially evacuated, and the pelvic cavity flushed with salt solution, and two large rubber tubes filled with gauze carried to the bottom of the pelvis, and the external wound partially closed. He was placed in the Fowler position and did well, there being free drainage, almost no

elevation of temperature, notwithstanding he got up and went to the water-closet on the second day, without permission, of course. He was apparently convalescent, with good appetite, no pain, and bowels moving well, when, on August 29, three weeks after the operation, he commenced to vomit and complained of severe abdominal pain with some distention of the abdomen. Gastric lavage and rectal enemata did not stop the vomiting, but did cause a bowel movement. On the 30th an enema of vinegar was given, which produced a fecal discharge twenty minutes later, but did not relieve the pain and vomiting, so on August 31 he was anesthetized and an incision five inches in length was made through the left rectus muscle, as it was thought the obstruction was situated on the left side. The intestines were distended, adherent to the abdominal wall, extensively matted together, and densely adherent in the pelvis to the drainage tracks. Collections of pus were also found in the pelvis and about the cecum, and there was a glandular enlargement in the mesentery. It was necessary to puncture the gut and allow its contents to escape, and an accidental opening was also made in separating the adhesions; these openings were closed, and the adhesions separated chiefly by means of gauze pressure. The intestines bled freely and in some places were denuded of peritoneum extensively, which could not be replaced. The abscesses were drained and the patient, now much shocked, was put to bed. The vomiting continued, but the pain ceased and his condition improved, though neither feces or flatus passed per anum. For some reason the whole area between the two abdominal incisions sloughed, leaving an oblong gap in the belly wall. This dead tissue was cut away and coils of intestines were found lying in the hiatus and adherent to the margins of the wound. The gut was punctured and a tube introduced and surrounded with a purse-string suture. This drained the bowel, and the vomiting ceased at once and never returned. An external fistula was thus established and, subsequently, an additional opening

formed spontaneously in the exposed intestine, and through these the whole intestinal discharge took place. The patient lost flesh rapidly and became almost a living skeleton; his skin became excoriated by the discharges, and his life was very miserable. I tried to close the openings in the bowel, but without success. On September 27 he was anesthetized with ether and I again opened his abdomen by an incision on the right side, and found the intra-abdominal condition better than I had expected. I was able to attach the small intestine to the transverse colon with a Murphy button, and then closed the fistulous openings. The intestines were still very adherent, and suppurating cavities still remained within the abdomen. He was now freely fed with milk and eggs and improved some, but the fistulæ did not close, and whilst he had bowel movements from the rectum, a large portion also came through the openings and caused much distress. The open space in the abdominal wall gradually contracted, and the abscess cavities healed, and on November 15 I again opened his abdomen and found the adhesions very largely absorbed, and I was able to loosen the intestines from each other and the abdominal wall. During this procedure the intestine was torn, and it was necessary to resect six or eight inches and restore the continuity of the tube by a lateral anastomosis, and to close the other fistulous openings by suture. I was also able to close the gap in the abdominal wall without great tension. He had no unfavorable reaction from this operation, his highest temperature being about 99°; the sutured intestine united, and his condition at once improved. Small quantities of albumen were allowed in forty-eight hours, and gradually increased. Milk, soft eggs, and soft toast were soon added, and free alvine evacuations took place in a normal manner, and he began to take on flesh and look less like a skeleton, and eventually recovered.

ACUTE DILATATION OF THE STOMACH AS A POSTOPERATIVE COMPLICATION.

By C. Jeff Miller, M.D.,
New Orleans.

Among the unexpected complications that may arise after surgical operations, no condition has furnished a more distressing chapter than acute dilatation of the stomach.

To one who has not had occasion to deal with this complication, or taken sufficient interest to investigate the published clinical records, it might appear that the subject was one of more interest to the internest than the surgeon. Sufficient evidence has long since accumulated, however, to prove that the surgeon will meet with more than half of the cases; that it may promptly follow minor surgical procedures, and may rapidly lead to a fatal termination.

Authorities generally attribute to Hilton Fagge the first definite description of the clinical features of this condition.

It seems, however, that Campbell Thompson's first collective study of all cases published up to 1902, aroused more interest in the subject than any other contribution prior to that time. He was able to collect 44 cases, most of which appeared as autopsy reports.

In discussing the cause of this affection he divided the cases in five groups, viz.:

1. Those in which dilatation occurred without apparent cause.

2. Those in which, after death, some other lesion was found.

3. Those where some gross indiscretion in diet seemed to be the chief cause.

4. Those in which dilatation followed an injury.

5. Those that followed a surgical operation, no other lesion being demonstrable at the autopsy.

Of these various groups only the last one is to be considered the one of special interest to surgeons, since it contains the majority of the reported cases and is most frequently met with as a sudden, unanticipated, and, occasionally, late complication of surgical operations.

Of Thompson's 44 cases, 12 followed surgical operations, 6 being abdominal. The remaining 6 followed operations varying from a breast amputation to resection of the ankle.

F. F. Simpson, in a recent contribution, states that 80 additional cases have been reported since Thompson's article (1902), 40 of which followed abdominal (including kidney) operations. This would show that the condition is being recognized oftener, and that, possibly, many cases were formerly overlooked, and either died or were so mild as to recover and be classed as an ordinary gaseous distention.

Of all publications at my command, that of Lewis A. Conner is the most complete and most valuable. He found that prior to March, 1907, 102 cases had been reported, 41 per cent. of which followed operations performed under general anesthesia. Nearly one-third of these cases (15) followed various operations upon the gall-bladder and bile passages, while all other abdominal operations furnished only 17, or two more than the liver series.

From scattered clinical reports at my disposal, it seems to occur with peculiar frequency after kidney surgery. An interesting instance of this type is reported by Halstead, of Chicago, in which acute dilatation of the stomach followed fixation of the kidney.

Injuries involving the central nervous system and deformities of the spine, have furnished another interesting group. Conner found six cases complicating deformity of the spine.

Bloodgood mentions two cases reported by Neck (probably not in Conner's series), of two kyphotic subjects developing the condition after overindulgence in food, and mentions others that developed after the application of plaster-of-Paris jackets.

Conner also calls attention to the curious fact that the literature did not reveal a single instance of this complication following operations on the stomach itself. Since his publication, however, Bloodgood has recorded two instances where dilatation followed stomach operations. In one case acute gastromesenteric ileus followed a pyloroplasty (Finney's method), and, in another instance, after gastroduodenostomy.

It is important to mention here the possible influence of anesthetics and their comparative dangers. It has been shown that in almost all of the cases, in which the nature of the anesthetic was mentioned, chloroform had been administered. In one instance ether (preceded by nitrous oxide gas) was used. In other cases Conner thinks that while the anesthetic used was not mentioned, it was altogether probable that ether had been employed. In Halstead's case morphine ether anesthesia was used.

Pathology. The postmortem findings have been so variable, and yet so constant in certain features, that several theories are necessary to explain the complex mechanism of acute dilatation.

It must be accepted that many cases are not primarily a paralysis of the stomach wall, but develop as a result of mechanical obstruction at some point beyond the stomach. It is necessarily of importance to inquire as to the frequency of mechanical obstruction, since any effort at treatment depends upon the cause. The obstruction is rarely ever at the pylorus.

Conner found the duodenum reported as dilated in 55 per cent. of 69 autopsies, and thinks it probable that in some a dilated state of the duodenum was overlooked.

The next interesting feature was that in exactly one-half of the cases in which the duodenum was found dilated, the point of obstruction existed at the crossing of the duodenum behind the root of the mesentery, or, in other words, at the duodenojejunal junction.

It is impossible to discuss at length the mechanism of gastromesenteric ileus.

Albrecht accepted Glenard's suggestion, viz., that an overdistended loop of small intestine may, by traction upon the mesentery, convert the mesenteric artery into a constricting band at the duodenojejunal junction. It is also possible that an overdistended stomach pressing the intestines downward may create a similar constriction.

Albrecht investigated this phase of the subject on the cadaver and found that the terminal end of the duodenum is normally flat, owing to the overlying mesentery, and, also, that traction on the mesentery in the direction of the pelvis could cause complete occlusion of the bowel.

Conner also investigated the subject on ten cadavers, and his conclusion is that in a certain proportion of normal individuals a pull upon the mesentery approximating, in direction and force, that which might be exerted by the empty small intestines hanging in the true pelvis, can produce obstruction at the lower end of the duodenum which will require considerable force to overcome.

The other type of cases can only be explained by accepting the theory of primary paralysis of the stomach wall, most probably through the splanchnics. This may be caused by anesthetics or other toxic agents. The chief features to be worked out are: (1) The paralytic condition, and (2) the hypersecretion, which plays a prominent role. Opinions differ as to which is primary, or whether one is dependent upon the other.

Whichever is the cause the result is the same, a vicious circle is established.

Hypersecretion may be accounted for in several ways. It

may be the result of Nature's effort to eliminate poisons usually removed by the kidneys and liver, or a terminal manifestation of grave toxemia. It might also be the secretion of the liver and pancreas regurgitated into the stomach because of the duodenal obstruction.

Simpson states that in a considerable number of the recorded fatal cases, the kidneys have actually been operated upon; and in many other cases the statement has been made that the urine was scarce or loaded with albumin and casts.

The most constant feature noted at postmortem is the enormous size of the stomach. It is often found extending into the pelvis. It usually fills the abdomen and pushes the small intestines down into the pelvis. The musculature may, or may not, present changes. Hemorrhage often occurs into the muscular layer; in other instances the muscle fibers are torn apart, while, in some, nothing more than an unnatural thinning of the wall can be demonstrated. The mucosa occasionally shows superficial erosions.

The shape of the distended stomach seems characteristic. A sharp, angular bend is found in the lesser curvature, which converts the organ into a tight V- or U-shaped cylinder, the cardiac end extending downward, the pyloric end upward and to the right.

Prognosis. One must conclude from the various autopsies mentioned in the reports that acute dilatation of the stomach is probably as serious as any postoperative complication that may arise.

The latest statistics (those gathered by Simpson) showed that of 128 cases, 86 died, apparently yielding a mortality of 69 per cent. Kayser's collection of 60 cases, quoted by Bloodgood, yielded 71 per cent. of deaths.

Conner's exhaustive study of 102 cases showed 74 deaths, or 72.5 per cent. deaths and 28 recoveries.

All of these authors, including Halstead, express the belief that such figures do not represent the true ratio between the

patients who die and those who recover, for undoubtedly a large number of cases pass unnoticed.

The recognition of acute dilatation should not be difficult. There are three constant and striking symptoms: vomiting, pain, and abdominal distention.

The first of importance is vomiting. It appears to be the first symptom, and usually continues throughout the attack, increasing in severity as the case progresses. The most noticeable feature of the vomiting is the large quantity of fluid ejected. Several quarts may be vomited in a few hours. It is usually thin, oftenest of greenish color, but may be brown and may contain some blood. Conner mentions, as a feature of great diagnostic importance, that the vomitus may be foul smelling, but rarely feculent. There is a large quantity of bile in the vomitus when the stenosis is below the ampulla; this is especially true of postoperative dilatation. In all forms of dilatation after copious vomiting the abdomen is flat, and there is usually marked relief experienced.

The character of the vomiting is not sufficient to allow a differential diagnosis between acute gastroduodenal dilatation and high obstruction of the bowels. Bloodgood states that in high intestinal occlusion, initial pain accompanied by peritoneal shock, which may later somewhat disappear, and vomiting without marked distention are the symptoms which differentiate it from acute dilatation. In the latter the initial pain is absent, the patients suffer from epigastric distress, the collapse is gradual and progressive, the most characteristic feature is the abdominal distention beginning in the epigastrium, and, in some cases, extending to the pubes. In high intestinal obstruction he found epigastric distention a very late symptom, and had not found great distention present at the operation.

Distention is nearly always present, splashing sounds are quite frequently heard, thirst is intense in most cases, and the urine greatly diminished in amount. Visible peristaltic waves are not often present, obstinate constipation is the rule, and

the temperature is almost always normal or subnormal. Rapid collapse is a striking feature, and may account for some of the mistakes in diagnosis.

If there is any doubt as to the condition the introduction of a stomach tube will usually confirm the diagnosis. A quantity of gas may escape, but usually a large amount of fluid containing bile and pancreatic juice will be syphoned off. An abundance of fluid without fecal matter denotes duodenal obstruction. Halstead states that the abdomen becomes distended, but dull on percussion instead of being typmanitic, as in ileus, either from inflammation or from paralysis of the intestine without peritonitis.

TREATMENT. The treatment may be summed up in a few words: Early recognition, prompt emptying and washing of the stomach, and such posture as may release a mesenteric compression. To these may be added any eliminative measure indicated if the emunctory organs are inactive.

Early diagnosis is essential to successful treatment. The cases reported as cured were instances in which the trouble was promptly recognized, and most authors predict a much lower death rate when the surgeon recognizes the frequency of such a complication and institutes early treatment. Whatever the cause may be, the strongest indication is to thoroughly empty the stomach by means of the stomach tube, and continue lavage at regular intervals. Nothing should be administered by mouth. Nourishment and fluids should be supplied by rectal enemata. The large amount of fluids lost through the stomach may be replenished by saline infusion.

Since the majority of cases result from duodenal obstruction, it is necessary to attempt the release of the compressed bowel. Postural treatment seems to be quite satisfactory in many instances. The first cure of obstruction reported was accomplished by turning the patient on the abdomen. The knee-chest position would be excellent if the patient can be so placed. Several instances are reported in which the

position was assumed for fifteen minutes every two or three hours, with satisfactory results.

Operative Treatment. Judging from the cases reported in which operation was done with the idea of relieving obstruction, surgery is not encouraging. In severe cases, when other measures have failed, surgical measures are strongly indicated; but both Simpson and Conner state that, so far, none of the patients survived. Bloodgood advocates gastrojejunostomy if the dilatation ends at the pylorus, or duodenojejunostomy if the duodenum is involved. Borchardt doubts if any good can be accomplished by operative measures in severe cases. Drainage of the stomach either by fistula or gastrojejunostomy certainly appears rational, and its success would depend upon the patient's condition at the time of the operation.

Unfortunately, collapse follows the initial symptoms so rapidly, as a rule, that operation will usually be too late.

In spite of the high mortality, however, there is strong evidence to prove that many cases can be saved by prompt treatment.

The following brief notes are given of a case:

Mrs. S. was admitted to the New Orleans Sanitarium for the relief of chronic suppurative disease of the adnexa, arising from gonorrheal infection four years prior to the operation.

She was twenty-seven years of age, the mother of one child, and gave a good personal and family history, except that she was slightly lame as the result of an injury to her hip during early childhood.

After curettage the abdomen was opened and both tubes and left ovary were removed. A gauze drain was placed through the vaginal vault. She recovered promptly and showed no distress until twenty-four hours after the operation, when the pulse rapidly increased from 80 to 150. Nausea was severe and vomiting soon commenced. Large quantities of greenish-colored fluid were ejected, and she

rapidly passed into collapse. Fluid literally ran out of her mouth, although she had been taking very little liquids.

Her chief discomfort seemed to be intense thirst. The urine was of a brown color, loaded with albumin and greatly decreased in amount. The pulse rose to 165, and continued so until after the stomach was emptied.

The abdomen showed a dome-shaped protrusion which filled the abdominal cavity as low as two inches below the umbilicus, and palpation gave rise to considerable pain.

The lower portion of the abdomen was flat, free from gases, and not sensitive to pressure. The temperature was subnormal. A diagnosis of dilatation of the stomach was made and a stomach tube was introduced. Over a quart of bile-stained fluid was drawn off and some gas escaped. Lavage was then completed with saline solution. She immediately felt relieved, but in three hours vomiting began again and the thirst increased. The stomach was again emptied of a pint and one-half of the same type of fluid. Some four hours later the condition seemed to be returning and she was then rolled on her side and placed as nearly in the knee-chest position as her condition would permit with pillows placed about her. She immediately expressed the belief that she was better and her condition rapidly improved. The stomach was washed a third time, after which she rested comfortably, and in two days her condition was practically that of the average abdominal section. She left the institution on the eighteenth day.

REFERENCES.

L. A. Conner. American Journal of the Medical Sciences, March, 1907.

F. F. Simpson. American Journal of Obstetrics, September, 1907.

A. E. Halstead. Surgery, Gynecology, and Obstetrics, January, 1907.

Christian Fenger. Clinical Review, Chicago, 1898.

Theo. Appel. Philadelphia Medical Journal, October, 1899.

Editorials. Journal of the American Medical Association, August, 1899, and October, 1902.

Box and Wallace. Lancet, 1898.

Jos. C. Bloodgood. Annals of Surgery, November, 1907

DISCUSSION ON PAPERS OF DRS. ROSSER, WINSLOW, AND MILLER.

Dr. Henry T. Byford, of Chicago.—My experience has been that the nausea is not always dependent upon the amount of the anesthetic consumed by the patient, but depends largely upon individual susceptibility, just as individual susceptibility to alcohol differs. Nausea is often almost entirely absent after an unusually long operation, and sometimes excessive after one of moderate duration. I usually give one ounce of brandy before the anesthetic is given, because I think that it has a slight anesthetic action, and slightly diminishes the amount necessary to maintain anesthesia as well as making it easier to go under it.

Dr. George Ben Johnston, of Richmond.—I have enjoyed the papers which have been presented to us. They are all valuable. It seems to me that the time has come when we should have very few complications following deliberate operations within the abdomen. Complications most naturally arise in those cases in which the surgeon has no option, when, in the endeavor to save life, surgical interference must be instituted without regard to the previous preparation of the patient. In deliberate operations, however, many conditions can be ameliorated or rectified that otherwise might be responsible for postoperative complications. The essential thing is the proper preparation of the patient preceding operation.

I cannot agree with Dr. Byford that prolonged anesthesia is not injurious. The minimal amount of the anesthetic agent and the briefest possible time in administering it are two important factors which conduce to the welfare of the patient. Therefore, if the necessary preparation of the operative field is made before the anesthetic is administered, and ether by the drop method, preceded by morphine and atropine, is used in as small a quantity as possible, the patient should go under its influence and come out in the shortest possible time, and be subjected to comparatively little danger.

In regard to the complications which may arise, the most important thing, it seems to me, is the prompt recognition of them. Fatalities occur because postoperative conditions are not recognized early, and therefore not promptly treated. Many serious complications may be made trivial and easily

relieved if quickly diagnosticated and energetically treated. I think that the careful study of every postoperative case will enable the experienced clinician to recognize an approaching dilatation of the stomach, and if this is done persistent and active treatment will save many patients. In my experience more than 33 per cent., which is the limit given by Dr. Miller, have recovered.

I do not agree with Dr. Miller, however, that the stomach should be washed out at stated intervals. At the first indication of gastric dilatation prompt lavage should be practised, and this should be continued as long as there is any tendency to vomiting. The treatment should be governed not so much by ourselves as by the actions and condition of the patient. After the first thorough lavage the slightest amount of vomiting is an indication for a second stomach washing, and this should be continued as long as there is any vomiting.

Dr. Rufus B. Hall, of Cincinnati.—I wish to speak of one condition that Dr. Rosser referred to in his paper, and that is in overcoming abdominal distention. When the patient arrives at that condition where glycerin, alum, and various kinds of enemata are used for overcoming the distention from gas, he omitted to mention one very effectual remedy; at least, in my hands, it has been very effective, and that is the hyopdermic use of eserine, not in the $\frac{1}{50}$ or $\frac{1}{100}$ grain doses, as recommended by many writers on the subject, but in $\frac{1}{15}$ or $\frac{1}{20}$ grain doses. In practically all of these cases, after you have tried various remedies, with failure to eliminate the gas, you all recognize how much better you feel when the patient can do so; you know that she is in a better condition to convalesce. Within forty minutes after the eserine has been administered, patients will commence to pass gas, and my rule has been to give them $\frac{1}{15}$ grain under the skin, and within forty minutes, if the patient is not relieved by passing large quantities of gas, to repeat the dose, that is, give them $\frac{1}{20}$ grain in forty minutes. It is rare that I have to give a second dose. I have used this remedy for about two years in more than 30 cases, and only in 1 case has it failed to induce prompt elimination of the gas, and that patient died without being relieved.

Dr. W. P. Carr, of Washington, D. C.—I have had good results from the use of eserine in quite a number of cases, and when I have had the stomachs of cases washed out directly

after operation and have given them a dose of eserine, when they left the table, there has been very little trouble from distention with gas or in getting the bowels to move afterward. Washing out the stomach after operation and giving $\frac{1}{30}$ grain of eserine on the table is very effective as a routine practice, except where the bowel is opened, and where we do not wish to get much peristalsis. I have used it effectively after operation, and in some cases of chronic constipation, but it is only effective when there is something in the bowels. If the bowel is absolutely empty, eserine does not seem to have any effect.

Dr. Charles H. Mayo, of Rochester, Minn.—I wish to speak for a moment on acute dilatation of the stomach as a complication of abdominal surgery. The mortality rate, I believe, is entirely too high, because, in our early development of the diagnosis of this condition, much of it followed autopsy work, and those cases are counted and reported, while many of the cases that have recovered have not been reported, and the question comes up early in the minds of those who have such cases whether it was really acute dilatation of the stomach or not. However, if one will look up the literature, I think he will find the disease is accompanied by a high mortality. I believe that it is a complication of a great deal of our abdominal work, and probably the most frequent complication that follows. In some degree there is a great amount of discomfort following operation; many patients nearly die, and some of them do die of it. If it comes on about the second, the third, or fourth day, the patients will show a marked condition of regurgitation of fluid. These patients lie in bed and vomit a peculiar green material in considerable quantity. Suddenly, as much as two or three quarts may be ejected. The lower abdomen in these cases is flat, while the upper abdomen is distended. The condition runs on for a brief period, possibly, when suddenly a profuse diarrhea develops. It is quite frequent to have a distended condition of the abdomen. A similar condition to that observed following gastrojejunostomy may be noticed in these patients between the sixth and seventh days after its beginning. It is a condition which can be readily handled by lavage, emptying the stomach, and keeping it washed as long as the stomach shows a tendency to refill. Many of these patients, after three or four washings, will be entirely relieved. Intestinal pesistalsis will start

up, the gas will pass, and they are practically new individuals. In our work in the upper abdomen, around the gall-bladder and pylorus, such ulcers as described by Bloodgood, in which gastroduodenostomy and pyloroplasty have been made, we find it is a condition that can follow either paresis or mechanical obstruction, as the duodenum passes through the mesentery of the transverse colon. If, in such cases, one can start out with a secondary operation between the fifth and seventh days, and make gastrojejunostomy, he will save patients as we have done.

Dr. Herman J. Boldt, of New York City.—I am in the same position that Dr. Mayo is. I do not think that the mortality is as high from acute dilatation of the stomach as has been quoted. However, dilatation of the stomach, of greater or less degree, is one of the most undesirable and frequent complications we have after abdominal sections. We must bear in mind that whenever we have evidence of an inflammatory process in the peritoneum, salicylate of eserine does no good, so that one must be careful in his selection of cases, and in reporting them. I do not believe that this agent is as advantageous as I at one time thought it to be, and as it is sometimes considered to be by my associates in surgery.

There is something that I am desirous of saying with reference to the treatment of postoperative complications. While some of you may laugh if I return to my pet hobby, yet I reiterate most decidedly, that if you not only permit but encourage very early mobility of patients after operations, you will find that the complications will be reduced fully 75 per cent., as compared with the complications that we have if we do not permit these patients to have free mobility.

Dr. J. M. Mason, of Birmingham, Ala.—I wish to speak of four points in connection with Dr. Miller's paper. In a case of pus tubes it became necessary to resect four inches of the bowel. Next day following the operation the patient developed an acute dilatation of the stomach, which was watched for thirty-six hours, and a diagnosis positively made, on account of the large quantity of green fluid vomited, etc. The four points I wish to refer to are: (1) This followed an operation under ether anesthesia. (2) It came on after the use of Fowler's position. (3) In this case, even after adopting the exaggerated Trendelenburg position at

the time of operation, the adhesions, which were low in the pelvis, kept the small intestine from being liberated. (4) The patient was entirely relieved by getting rid of the Fowler position, elevating the foot of the bed, and the use of lavage.

Dr. Hubert A. Royster, of Raleigh, N. C.—I desire to put on record a case of acute dilatation of the stomach following operation for the fixation of both kidneys. It occurred on the third day. The operation lasted twenty-five minutes, was done under ether anesthesia, was perfectly clean, and vomiting did not begin for twenty hours thereafter. The patient presented the usual signs and symptoms, and died on the fourth day after unsuccessful efforts to relieve her. A partial autopsy disclosed that the stomach was dilated in a U-shaped mass, extending down below the umbilicus. The patient never had any fever, the pulse never went above 120, but she literally vomited herself to death.

I think the condition occurs more frequently than has been heretofore supposed, but the mortality is not as great as has been said, because many of these patients recover without it ever being found out. I read Dr. A. E. Halstead's report, and the subject to me then was new.

My experience with the use of eserine has been more satisfactory when I have alternated it with hyoscine, getting the contraction with the accompanying relaxation of the gut, and being fortified by the use of alum enema. My practice has been in such cases to give $\frac{1}{50}$ grain of eserine and $\frac{1}{100}$ grain of hyoscine, alternately every other hour, repeating the dose two or three times, until the effect was secured and followed by the injection of the alum. I am inclined to believe, however, that this has been productive of a great deal of harm, because in cases of mechanical obstruction (and we are never sure that it is not present, or whether it is simply dynamic ileus) it would be of distinct and positive injury, both on account of the drug itself and on account of delay in interference.

Dr. John Young Brown, of St. Louis.—In regard to the treatment of the postoperative complications of peritonitis, I am inclined to agree fully with Dr. Johnston. The treatment of these complications should begin at the time of operation. With improved methods of diagnosis, based on a thorough knowledge of the physiology of peritoneal absorption, we may expect to accomplish better results in the future and

with fewer complications than we have done in the past. Formerly, however, our results were uniformly bad. The modern treatment of peritonitis is to get in as quick as possible, repair the original source of infection, and to get out as fast as possible. The older methods of eviscerating and of extensively irrigating have not been followed by the uniformly good results that have followed the modern methods of treatment, based on a knowledge of the physiology of peritoneal absorption and the bacteriology of this condition.

In reference to the Fowler position, I have treated the last ten cases of diffuse peritonitis without this position, and I am inclined to believe that with the relief of tension, with the little interference that is done with the drainage, and particularly with the relief of the intra-intestinal tension by the use of the stomach tube, my results are equally as good without the Fowler position as with it. I have had twenty-eight cases of diffuse peritonitis in the last four years, and until I began the treatment as given to us by Bond, in his classic paper, presented before the British Medical Association, and which was discussed by Dr. J. B. Murphy, in Cincinnati, before the meeting of the American Association of Obstetricians and Gynecologists, my mortality was exceedingly high. Since that treatment has been adopted, my mortality has been greatly reduced, and I concur fully in what the essayist has said. It is not so much the Fowler position as in getting these patients to move about in bed. In the ten cases treated without the Fowler position, the results have been as good as those treated with it, but I do believe that by following a simple technique at the primary operation we can do away with many complications that result from the original peritonitis.

Dr. I. S. Stone, of Washington, D. C.—It seems to me, that the agitation of mind of the patient by the surgeon has a great deal to do with the results which he obtains in abdominal surgery. We ought to learn that Nature has certainly mapped out for us a course to follow, and that is, after doing fairly good surgical work, to let the patient's bowels rest. Nothing has given me more satisfaction in the last four years than to learn that one need not be uneasy or anxious about the movement of a patient's bowels, about peristalsis, and that the administration of purgatives before, during, or immediately after the operation is often unnecessary. It is absolutely impossible by any process of shaking up the

patient, by turning him or her from side to side, or by the assumption of any ordinary posture, to change the position of the intestines within the abdomen. That fact is settled in my mind, and I act accordingly. In intestinal contraction (peristalsis) the intestine does not move from right to left or up and down, and is not influenced by the position of the patient, but it proceeds in the direction of the intestinal tract. It is the transverse muscle which is at work. There is contraction behind the bolus, which proceeds in the direction of the fecal current. That has been satisfactorily shown. If the intestine alongside of that peristaltic movement is filled with gas, it fills in the space made by the contraction of the adjoining bowel. Therefore, if adhesions are present there will at first be no special gliding motion to separate these coils of bowel. We doubt if there is a gliding movement between adjoining coils of intestine until after peristalsis has been established. If we can establish that fact as a basis upon which to build our idea, then we will be satisfied. But, more than that, it seems to me that when we begin to give purgatives immediately after operations, we defeat the purpose we attempt to accomplish. I have performed quite a number of operations in the last five years, and have not had a single death from ileus. The proper adjustment of the sigmoid, the ileum, and the omentum should leave but little opportunity for formation of firm adhesions. The serum secreted by the peritoneal glands has a definite purpose in preventing bowel adhesions; it has more efficacy than is generally supposed. After operation if two irritated or denuded peritoneal surfaces are opposed, they will so lie until about the end of the next twenty-four hours without perceptible movement. There is, at least, very little motion or movement between these two surfaces during this time. The glands of the peritoneum now throw out a lubricating serum between adherent surfaces as elsewhere, which promotes peristalsis. We need not expect that peristalsis will overcome adhesions formed between exposed muscular surfaces. There will be union of these surfaces, but the adherent surfaces covered by peritoneum are separated by maceration, by the throwing out of serum, and by the lubricating effect of that serum, all of which is accomplished as rapidly as each physiological process is restored.

Dr. Edward H. Ochsner, of Chicago.—I wish to emphasize what Dr. Stone has said, namely, that the sooner we, as surgeons, learn to recognize that in all acute and subacute inflammatory conditions of the peritoneum or intestines that rest favors repair and motion favors adhesions, we will do better by our patients.

Dr. C. W. Rosser (closing the discussion on his part).—If there were doubt as to the propriety of a discussion upon these subjects, the divergence of opinion disproves it. Dr. Byford, if I understood him, disregards the time element in anesthesia, does not consider the total dose important, but rather favors a long anesthesia gradually accomplished. Others accept the suggestion that prolonged inhalation of either chloroform or ether will have a progressively toxic influence which favors shock and other conditions of enervation. Then from Dr. Ochsner we learn that "rest favors repair and mobility means adhesions," and from Dr. Boldt that the opposite rule is of practical safety. Dr. Stone also insists on the decubitus, and yet I am not convinced that the plan I mention is not correct. I believe that the Fowler position, when practical, secures stomach drainage, drainage increases desire and digestion of foods, assimilation builds new blood, good blood resists infective processes and aids pathological repair. However, "it is wonderful what you can ascertain by finding out, and things that are in doubt are very uncertain."

Dr. Winslow (closing).—I have been very much interested in the full discussion of the papers that have been read. My own paper dealt with the complications of one disease only, those of peritonitis, not with general abdominal surgery or surgery in particular.

I was desirous of learning whether, in the hands of others, intestinal obstruction, ileus particularly, and other complications following the treatment that is now accepted as correct, of peritonitis, namely, the elevation of the patient after section and pelvic drainage, have taken place as they have in some cases of my own and in those of my colleagues. But I have not learned much in regard to this matter; also, I was particularly anxious to be told whether or not we can do without the postural method, and whether we can do without drainage to such an extent as we have been using it. But, unfortunately, there has not been any discussion on these points.

In regard to the acute dilatation of the stomach following operation, I have had some experience also, fortunately, not in my own work as much as in the work of my colleagues. I recall one case in particular where a patient, after a gall-bladder operation, was extremely ill with a pulse of 160 to 170, and apparently at the point of death, but when a tube was introduced and the stomach evacuated there was a prompt and satisfactory recovery.

TRANSPERITONEAL REMOVAL OF TUMORS OF THE BLADDER.

By Charles H. Mayo, M.D.,
Rochester, Minn.

The modern facilities for making examinations of the bladder are aiding greatly in the diagnosis of diseases of this viscus. In the natural evolution of the surgery of this region, which is still far from being crystallized, many changes from former methods of treating diseases and their complications have become necessary.

When we consider Watson's statement that 28.6 per cent. of benign, and 46 per cent. of carcinomatous growths of the bladder have been operative failures, we can see the necessity for improvement in methods in order to secure better results.

Since it will be the purpose of this paper only to urge a more radical method of treating certain tumors of the bladder, special attention will not be given to a pathological report of the various growths which affect this organ, nor to a discourse on tumors of the prostate involving the bladder.

The methods in ordinary use today, are the treatment or removal of tumors of the bladder through the urethra, or by suprapubic incision, and, occasionally, in the female, by an anterior vaginal incision; the latter route, however, is seldom employed. The work done through the urethra requires special skill, and for an apparently safe procedure in both benign and malignant disease, it is accompanied by a rather high mortality.

The common method of removing bladder tumors is by a suprapubic opening. An abdominal incision is made which preserves the peritoneum intact and opens the bladder in Retzius space. In this way papillomata have been removed with 20 per cent. mortality, carcinoma with 28 per cent., and sarcoma with 63 per cent.—according to Watson, who has collected a large series of cases from many operators. As a rule there is a rapid recurrence in over 20 per cent. of these tumors.

Patients complaining of symptoms which indicate disease of the bladder or kidney, are now so frequently given a cystoscopic examination that tumors are found at an early period of their development and can be operated upon at a time when they should be curable. An important point to be noted in the cystoscopic examination for the diagnosis of small pedunculated papilloma, is that the examiner should be familiar with both water and air distention of the bladder. In water these tumors float out from the mucosa, while in air they collapse and stick to the wall of the bladder. The removal of portions of tumor for microscopic examination may often be accomplished through the urethra. At times portions of growths can be torn off by curettes and washed from the bladder to be collected and examined microscopically. The evidence thus given will often have great influence in the choice of the method of operating, which will give the greatest possibilities of cure.

Large papilloma of the bladder, either benign or malignant, have the same tendency to return after removal; about one in four doing so very soon after operation.

Considered from an operative standpoint there are three types of tumors of the bladder: (1) Those with a pedicle; (2) those with a broad surface area of growth from the mucosa; (3) those which involve all the walls of the bladder. Owing to the great tendency to recurrence as well as to change in character, these tumors must be treated radically. The usual result of imperfectly removed cancers is to render only

Fig. 1.—Cautery resection of papilloma of bladder.

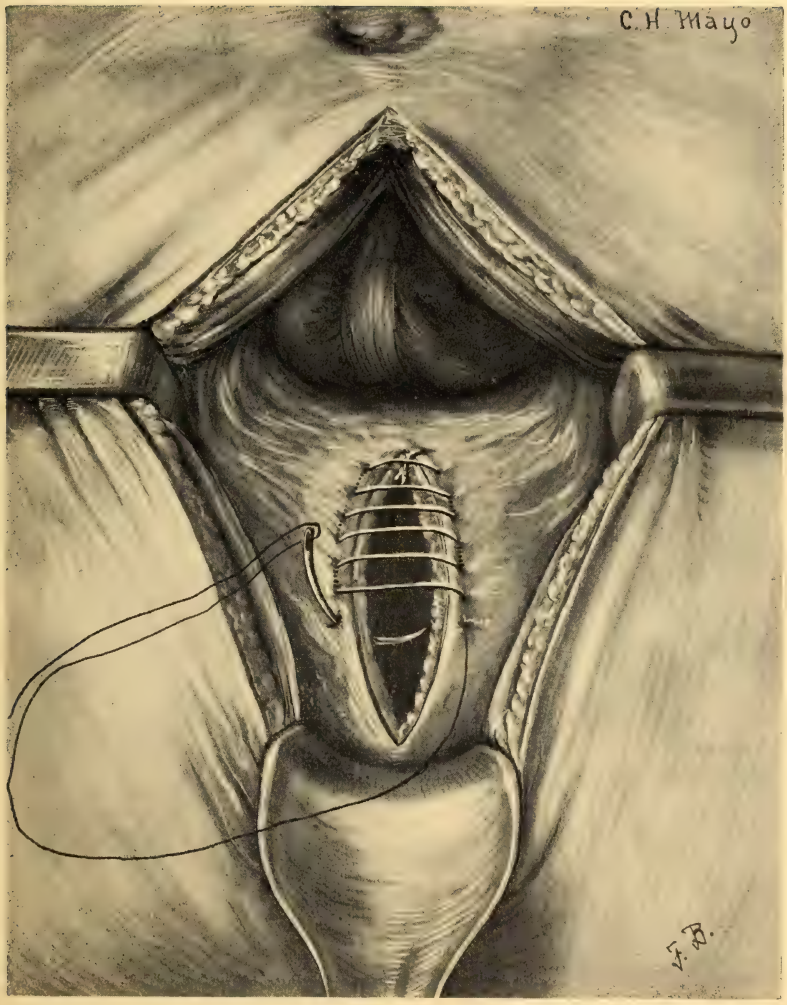


Fig. 2.—Showing method of closure of bladder incision.

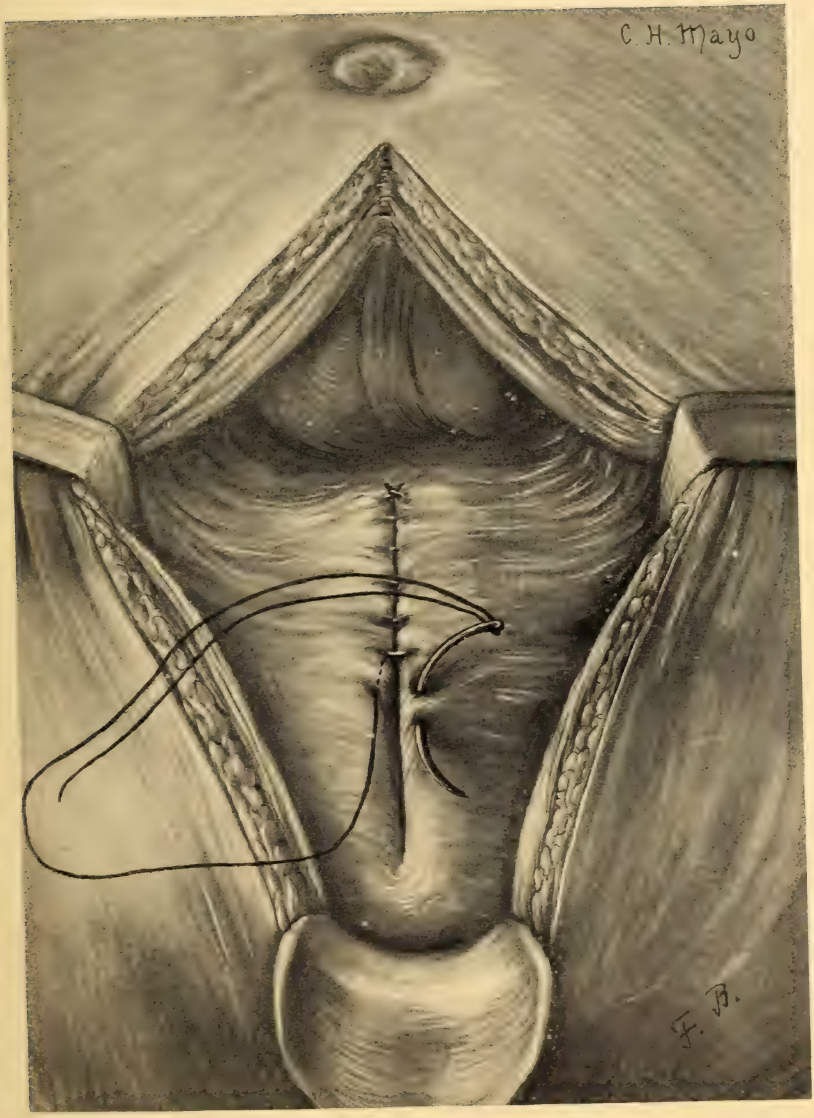


Fig. 3.—Cushing peritoneal suture closing bladder wound.

FIG. 4.—Removal of large amount of bladder with transplantation of ureter.

temporary relief, the growth of the recurring tumor being more rapid and the ultimate condition of the patient, if anything, worse than before the operation.

Tumors with a pedicle must be removed to the mucosa and the growth cauterized or curetted. If malignant, the thorough office of the cautery should be given preference.

Tumors with a broad base of attachment to mucosa should be removed and the actual cautery applied over the area.

Nowhere in surgery is an immediate examination of removed tissue of more importance than in these cases, and if by immediate frozen section they are shown to be malignant, the involved area of the bladder is resected as well as cauterized at its margins. There are few lymphatics in the bladder mucosa; therefore, it is often noted that a malignant tumor may remain for a long period as essentially a local disease.

Carcinoma of the bladder involving local areas and not by continuity of structure involving adjacent tissues, may be looked upon as curable by operation. Very large areas of the bladder, two-thirds or more, can be resected and the remainder will regenerate to a considerable extent, often forming a very serviceable bladder as pointed out by Harris.

We have not been satisfied with the method of removing large tumors of the bladder through the ordinary suprapubic incision, which seemed the most radical of the ordinary operations. While several of our cases did excellently well, in two instances of cancer we not only failed to cure the local condition, but unfortunately transplanted the disease to the abdominal wall and space of Retzius.

In the effort to develop an operation which would render all parts of the bladder accessible for any operative procedure, the transperitoneal method seemed to be the most favorable. This method of approach has been described before, notably by F. Harrington (*Annals of Surgery*, 1893), but evidently failed of appreciation. When used by others it has usually been developed of necessity or accident at the time of operation, and without previous plan.

Operation. The bladder is cleaned and emptied, the patient placed in the Trendelenberg position, and a median incision made from the pubes upward for six inches or more. The pelvis is well packed with gauze pads which hold the intestines in the upper abdomen. The abdominal incision is also protected by gauze pads. The bladder is caught by two tenaculum forceps, lifted into the wound and opened by a two-inch median incision. The small amount of fluid in the bladder is absorbed with gauze, and the incision is enlarged upward and downward until it is equal to one-third or more of the longitudinal circumference of the bladder. The tumors are cut from the bladder with scissors and the area burned with the cautery. The bladder wound is closed by a through-and-through continuous suture of catgut introduced in the original Connell method. This stitch is a running suture and is passed through the entire thickness of the bladder wall, all loops pulling from the mucus side, and when drawn close making a complete air-tight and water-tight, continuous mattress stitch. The line of suture is now protected by a second suture of silk, or preferably linen, applied as a Cushing parallel peritoneal suture, taking a square bite of the peritoneum first on one side, then on the other, of the line of closure, the needle being inserted parallel with the incision. This suture approximates the peritoneum and protects the primary suture just as when it is employed in gastrojejunostomy.

Should the bladder incision pass forward of the peritoneal fold the closure will be the same, and is accomplished by drawing the bladder toward the abdomen and carrying the peritoneal fold to a lower level, the advantage of securing early peritoneal adhesions being developed to the fullest extent. As a rule the abdominal wound is closed without drainage, but should the general cavity of the peritoneum become soiled, a temporary drainage could be made through a stab wound. The bladder is catheterized at regular intervals for the first few days following the operation, if it is

necessary; but, as a rule, they void their urine at frequent intervals with little distress.

Bladder tumors which are accompanied by much cystitis may require preliminary treatment to secure temporary improvement of the local conditions. It may be necessary at times to drain certain cases following operation either by permanent catheter or by suprapubic opening in the front of the peritoneum, infrapubic, or by peritoneal pocket.

We have in five instances, without mortality, operated upon large papillomata of the bladder by the transperitoneal route. In three of these cases the tumors were carcinomatous, the others benign. We recognize well the gravity of the method recommended, and wish to be understood as advising the operation for the occasional case, where it is believed that former or less radical measures would be inadequate to cure the patient.

TREATMENT OF THE BLADDER AFTER SUPRAPUBIC CYSTOTOMY FOR STONE.

By William S. Goldsmith, M.D.,
Atlanta, Ga.

The surgery of the bladder and prostate gland has, within the past decade, enjoyed such satisfactory progress that operative methods are being reduced to general rules of simplicity of technique and the recognition of certain physical conditions which determine the course to pursue.

In no other branch of surgical endeavor has a greater change of practice occurred than that of dealing with vesical calculus. The days of the lithotrite and of perineal lithotrity are happily passed, and instead the simple, safe, and quickly executed suprapubic operation is now universally in vogue.

The operations for calculi in the kidney and gall-bladder demand an after-treatment based on the rational ground of thorough open-wound drainage, the importance of which is apparent as a surgical necessity and is emphasized by the danger of recurrence of the condition. It is my desire to submit the result of my work on these lines, and, in so doing, do not put forth the claims of priority or originality.

The principles governing the treatment of the bladder after suprapubic cystotomy are:

1. The immediate and complete closure of the bladder and abdominal wound.

2. The institution of urethral retention catheter drainage.

A series of external urethrotomy cases, in which the retention catheter method was used, and following the closure

of the perineal incision, convinced me of its efficiency and of the tolerance of the bladder to these unusual conditions. That an interruption of the muscular continuity of the bladder wall results in a serious interference with the functions of the organ is a well-known fact, and the prompt resumption of function is demonstrated following immediate wound closure, and after having established effective drainage for a period of forty-eight to sixty hours.

Perfect urethral drainage is such a necessity that failure of securing successful results are attributed to some imperfections of this important factor of treatment.

Again, some hesitancy may obtain concerning the propriety of suturing indiscriminate bladder wounds.

It would be difficult to conceive of a normal bladder which contained a calculus. Structural changes of the mucous membrane and hypertrophy of the muscular coat are always present, and not infrequently the ureters and kidneys may be involved, but none of these circumstances must influence us in determining that the bladder should not be closed.

If non-union occurs (note that I do not use the term leakage) the situation is, in the face of such sequels, much more surgical than if no such attempt were made to suture the wound.

To those of us who have treated the bladder by both methods, *i. e.*, the suprapubic drainage and the urethral catheter drainage, I would direct your attention to the conditions which surround the first method. The posture of the patient renders impossible the satisfactory emptying of the bladder. However complete the siphonage principle may be carried out, it requires persistent coöperation on the part of the patient and unceasing watchfulness by experienced attendants. The slightest interruption of detail with this rather elaborate apparatus, or even the most simple device, results in disarrangement and soiling of dressings and increases the danger of wound infection and abdominal complications.

The urinary fistula, which always succeeds this treatment, is a source of much anxiety to the surgeon and the patient, as its ultimate closure is a matter of vague speculation.

The cicatrix resulting from a suprapubic fistula is a constant menace to the integrity of the bladder, in that an inelastic, artificial ligament anchors the fundus in a more or less fixed position, thereby destroying the symmetry and muscular rhythm so essential to perfect functional activity.

The preliminary treatment of these cases consists in the employment of such local and constitutional medication as seems indicated for each individual. In persons from south Georgia and Florida, large doses of quinine are administered for several days before the operation, which fortifies the patient against a probable attack of malaria, and at the same time minimizes the danger of the so-called urethral chill. I unhesitatingly condemn the extreme distention of the bladder with fluids, or air, or efforts to elevate it by rectal pressure. The great majority of these bladders are contracted, with thickened coats, and are unfit to receive and sustain the strain of a variable and unknown intravesical pressure. A careful dissection cannot fail to bring the organ sufficiently into view to grasp it with tenacula and secure such fixation as will permit of a clean-cut incision, sufficiently large to easily extract the stone.

Large stones cannot be removed through small incisions without seriously macerating the mucous membrane and other coats and leaving a ragged, lacerated suture line altogether unsurgical in character, and encouraging tissue necrosis with eventually bad results. Upon the removal of the foreign body the wound is protected with gauze, the patient turned upon his side, and the bladder thoroughly irrigated with urethral catheter. The wound is closed tight with interrupted silk sutures, introduced down but not including the mucous membrane. The abdominal incision is closed with small chromic catgut and cotton, and collodion applied. Elaborate abdominal dressings are not used for the reason

that they serve no purpose other than to interfere with the freedom of the patient in turning from side to side, the importance of which admits of no question.

If the patient has a stricture it is cut, and, if necessary, physical conditions being favorable, an external urethrotomy may be done. The urethrotomies are considered collateral parts of the after-treatment. A large, soft, rubber catheter is then introduced through the urethra to the bladder and held firmly in position by adhesive strips placed on and around the penis.

In the event of an external urethrotomy this wound is closed with silkworm-gut sutures, and I have the satisfaction of knowing that the large catheter, which snugly fills the urethra, is the means of not only accomplishing drainage, but continuing, for the time, effective urethral dilatation.

The retention catheter remains in this position as long as circumstances indicate. I have removed it in forty-eight hours without wound leakage and complete return of vesical function. Six or seven days usually should elapse before withdrawing it. Daily irrigations with some bland solution is urged, as the inflammatory conditions are not only thus improved, but the intravesical portion of the catheter is kept clean and prevents the fouling by the urinary salts, which would otherwise be deposited in great quantities, rendering its removal both painful and dangerous.

In adults, and particularly men of middle age, posture is a most important detail. The ability to turn on either side and the insistence of frequent change of position stimulate urinary secretions, prevent puddling of urine, and insure a clean, collapsed cavity which at once begins a regeneration of exhausted anatomical and physiological vitality. The semi-erect, and, finally, the erect position is quickly assumed, and every effort is directed along the line of forced recuperation and rapid convalescence.

DISCUSSION ON PAPERS OF DRS. MAYO AND GOLDSMITH.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—This subject is particularly interesting to me. Early in 1890 or in 1891 we decided to abandon the perineal route, which was then the popular route with us, and adopt the suprapubic. The question with us was one of immediate closure. I will not go into the details of the subject.

In looking over a book by Grieg Smith, published some years earlier, I found that he outlined theoretically the question of closing the bladder immediately after the removal of the stone. Our work was based on that, and after all stones were removed, unless there was a pathological condition indicating drainage, and unless the stone itself was of a phosphatic character and the particles adhered to the mucous membrane of the bladder, and there would probably be a recurrence of the stone, we closed all of them.

Our method is simply to dilate the bladder by pressure with water, always opening the abdomen, so that the water was thrown into the opening instead of flattening out against the muscles. After opening the bladder, depending upon the size of the stone, it was closed with the interrupted mattress sutures of Halsted, and the bladder closed up perfectly tight.

The question was then with reference to subsequent drainage of the bladder and subsequent drainage of the abdominal incision. We did not drain our first cases, so that the abdominal incision was closed with the exception of gauze drainage, but after the first case we closed the abdominal incision without drainage. In the drainage of the bladder itself, in the first case, we decided to use a catheter at stated intervals, in order to aid the gauze for the first twenty-four hours. In this first case, however, the patient passed the catheter during the night, and found that he could urinate all right without any discomfort or pain, and the pressure was relieved. After that bladder drainage was done away with.

As to the phosphatic stone, it is an interesting specimen. It illustrates the character of stone in which drainage is used, and in which the history of the stone extended over a period of five years. A splinter was carried into the bladder. The stone was passed about three months after injury. The

splinter went through the edge of the peritoneum and then into the bladder, deep in front, and the peritoneal opening was closed and the bladder drained through the penis and through the external route.

This patient was operated on about six months after the original injury, and about nine months after he was again operated on; that is, five years and three months after the reception of the original injury. This stone is phosphatic in character, and, as in most of these cases, you will find that the phosphatic stones are adherent to the mucous membrane of the bladder. With a spoon we found it impossible to scrape them all off. Those cases in which there is a pathological condition of the bladder are the only ones that necessitate drainage.

I reported a series of these cases at the Washington meeting of the Association in 1895.

Dr. Hugh H. Young, of Baltimore.—I think we owe Dr. Mayo many thanks for bringing up this very important and much neglected subject, the surgery of vesical tumors. There is no doubt but that the results have often been very unsatisfactory and recurrences frequent after operation, and the intra-abdominal route certainly furnishes a very radical method of dealing with tumors in the posterior wall of the bladder. Last year I carried out this method upon a patient in Baltimore. In this case a suprapubic operation revealed an extensive involvement of the entire thickness of the bladder wall in a fungating carcinoma. The only portion of the bladder which remained intact was that lying between the ureteral orifices and the prostatic urethra. A curative operation was out of the question, and I at first simply provided suprapubic drainage. The sinus was difficult to keep open, a drainage tube caused great pain, and the constant presence of urine, which was voided with difficulty, caused great distress. I therefore decided to perform double nephrostomy so as to prevent any urine from reaching the bladder, as suggested by Watson. This was easily done, both ureters being ligated, and for a time was followed by great benefit, but a little later the patient began to have spasmodic contractions of the bladder upon the tumor itself, and he suffered so greatly that I advised excision of the bladder with its tumor. After opening the abdomen the pelvis was freed of intestines which were packed off with gauze. A beautiful exposure of the

posterior surface of the bladder was obtained and no difficulty was experienced in freeing its lateral walls. Owing to the fact that the peritoneum was involved no attempt was made to separate that covering the posterior wall of the bladder. Almost all of the bladder was then excised, leaving only that portion included between the ureters and the prostatic orifice, an area about the size of a silver dollar. Very little hemorrhage was produced. The cavity was then packed with gauze with a layer of rubber tissue separating it from the intestines. The patient stood the operation well, and in the course of ten days all of the gauze and rubber tissue had been removed, and only a small sinus remained at the lower angle of the wound. The relief afforded was wonderful and immediate. Spasmodic vesical contractures were, of course, impossible and the patient suffered so little pain that he ceased taking morphine, left the hospital in five weeks, and lived in comparative comfort for eight months; whereas, before the operation he was in great agony most of the time.

The intra-abdominal operation for vesical tumors will be used more and more, but its field is necessarily limited. Good exposure of the vesical cavity can be obtained without opening the abdominal cavity if one is careful to push the peritoneum upward off the anterior surface and vertex of the bladder. At times, in so doing, it may be necessary to divide the urachus, but no difficulty is experienced, usually, in getting a wide opening and thoroughly exposing the entire vesical cavity. In a recent case I was able to excise, with an eliptical area of mucous membrane, ten papillomatous tumors, and to suture the denuded areas with catgut in each case, and in other cases have removed also the entire thickness of the bladder wall. Since most tumors of the bladder are in the region of the ureteral orifices, the trigone, or the lateral walls of the bladder, the suprapubic will generally be preferable to the intra-abdominal incision, but for tumors of the posterior wall of the bladder, and, possibly, the vertex, and especially for those that are malignant and in which it is desirable to remove the entire thickness of the bladder wall, the intra-abdominal route will certainly be very advantageous. Success in dealing with vesical tumors depends largely on early diagnosis, exact localization of the character and extent of the tumor by means of the cystoscope, an ample incision so at to get abundant exposure of the interior of the bladder, excision of the tumor

with its base and adjacent mucous membrane, or the entire bladder wall if carcinomatous, and suture with continuous catgut.

Dr. F. W. Parham, of New Orleans.—I had the pleasure, while on a recent visit to Dr. Mayo at Rochester, of seeing him do this operation for a simple papilloma of the bladder, and as the demonstration was so complete to my mind that the peritoneal cavity could be thoroughly protected, I determined to carry it out at the first opportunity.

Soon after I returned to New Orleans, a patient whom I had had under observation came back, and I carried out this procedure, resecting a considerable portion of the bladder. I could not close the bladder wound as systematically and artistically as Dr. Mayo does, and as shown in his pictures. Owing to the location of the resected part I had to unite the wound transversely. As it was an infiltrating tumor I found it impracticable to approximate anteroposteriorly. I united with linen in several layers. The patient, who was operated on last Tuesday, is doing well and I think will recover, although I much fear there will be a recurrence, as I thought I detected glandular involvement in a situation near the base of the bladder which I could not include in the excision. I believe, so far as the operative technique is concerned, it is an extremely valuable procedure. The protection of the peritoneal cavity is absolute, as the rest of the peritoneum is thoroughly protected by the large gauze sponges completely filling the pelvis and lower abdomen, with special gauze packs about the bladder. The bladder may then be opened and inspection is ample, and any practicable operative procedure can be carried out. Even the bladder can be enucleated after cutting it off from below, and the ureters, having been ligated, pulled through the tract, either as Dr. Young has stated after ligation in situ, or the whole of the ureters drawn out as done by Rovsing; drainage can be carried out through the back, as suggested by Watson. Dr. Mayo has pointed out how gynecological surgeons attack pus tubes without the slightest hesitation, and with abundant success; why should we hesitate to open the bladder under the same circumstances, where the danger is not as great as in the pus tube condition?

Dr. J. Wesley Bovée, of Washington, D. C.—There are several points in these papers that are of interest, and I will mention, first, the method of the application of sutures as

described by Dr. Mayo, which is in direct opposition to the ideas I have held for some years, and that is, of passing sutures through the mucosa.

Dr. Westmoreland has exhibited a stone and the foreign body which was introduced into the bladder or the urethra. We have numerous instances in ureteral and bladder surgery in which calculi form on suture material, and for that reason I have always particularly avoided passing a suture through the mucosa of the ureter. In ureteral anastomosis the suture is passed by some through the mucosa of the ureter and out through all the rest of the layers of the ureteral wall, which, I think, is inadvisable.

There have been about 112 cases of complete extirpation of the bladder reported for malignant growths and other conditions, most of them for exstrophy, and there has been no method yet devised of successfully disposing of the ureteral orifice. The best, probably, was the method of Maydl, which was modified by Pozzi, the Italian surgeon, of implanting the ureters into the intestine. These implantations into the skin have thus far proved failures, and in Young's case was followed by ascending infection. I understood Dr. Young to say that the patient died some months after operation.

Dr. Young.—About a year afterward.

Dr. Bovée.—Rydygier and other Frenchmen have shown and proved that there is an ascending infection to the kidney. Recently, at the German Surgical Congress, a German reported six cases in which he brought out the ureters to the surface of the body, let them hang loosely for about an inch, and adjusted the urinal to the holes in the loins to catch the urine; these ureteral projections finally sloughed and left a little papillæ, which assisted in directing the urine from the skin. He had not had, thus far, any ascending infection, but he did not say he had examined the cases thoroughly. The best method of dealing with these malignant growths is the complete extirpation of the bladder and some method of the disposition of the ureters in man into the intestine and in woman into the vagina. The latter plan, which was first successfully followed by Pawlick, has proved, thus far, to be the best method of disposing of the ureters in the extirpation of the bladder in woman.

I do not quite understand why Dr. Young removed a part of the tumor and left some of the bladder infiltrated with

it. But, perhaps, it was more difficult to remove the whole and he did not think it worth while to do it. These are the special points I would make.

As to the transperitoneal method of operating, it is a little different, where we have infection of the urine, from pus tubes. We do not operate on pus tubes by the abdominal route where there is active infection going on, and, therefore, we know the danger we have in operating on a bladder where we have such infection, and there will be that difference in the transperitoneal route. It seems to me the latter route, as suggested by Dr. Mayo, has many advantages over suprapubic cystotomy, however.

Dr. George Ben Johnston, of Richmond.—I would like to say that if Dr. Goldsmith will search the files of the *Virginia Medical Semi-Monthly*, he will find that in 1885 or 1886, about twenty years ago, I reported a series of bladder cases in which I removed all the stones and advocated closure of the suprapubic opening and catheter drainage at that time.

Dr. I. S. Stone, of Washington, D. C.—The paper of Dr. Mayo has brought before us very vividly the fact that the surgery he has described is so difficult that many of us would hardly undertake it. I am confident the majority of the members here, the gynecologists especially, would like very much to know how many women there are, who have cancer of the bladder as a result of extension of uterine cancer, who may be cured by operation. We want to know if such cases are entirely and permanently cured by excision of the diseased portion of the bladder. We have unhesitatingly operated in such cases, but we are not in a position to say that permanent cure has resulted. As to the propriety of opening the bladder, I want to endorse what Dr. Mayo has said. There is no reason why we should not open the bladder during the course of operation. In fact such action is often desirable, for valuable information may be obtained in this way, as we can testify.

If we can prevent further extension by excision of the diseased area, we ought to be able to cure some of the cases, but what proportion it is difficult to determine.

Dr. Geo. H. Noble, of Atlanta.—In cases of carcinoma of the uterus I have resected the bladder a number of times, opening it directly through the peritoneum. I do not regard the procedure a risky one; in fact, experience of the abdominal surgeon proves the assertion.

In the technique there are two points of importance: (1) Protecting the field of operation from the urine escaping from the ureters if infected. (2) Closely suturing the edges of the bladder, as the danger lies in leakage of urine. Suturing of the bladder wound including the mucous membrane in the sutures, as suggested by the essayist, has proved successful in my hands. The danger of vesicle calculus is reduced to a minimum, or nothing, if absorbable sutures are used. If unabsorbable sutures or chromic catgut is employed, the liability to calculus formation is increased.

Dr. R. M. Cunningham, of Ensley, Ala.—It occurs to me that the excellent technique of Dr. Mayo opens up a valuable method for certain traumatic conditions.

About two years ago a man, who was caught between two tram cars, was able to walk, and presented no symptoms except a blue spot over one trochanter and the scrotum; but he had a hemorrhage from the urethra. Our experience has been that the perineal method of treating these injuries was not successful; that the patient usually dies. My son operated on this man by the suprapubic method, and found that both the prostatic urethra and bladder were torn. He confined himself to the extraperitoneal method, of course, and through the small opening he had was unable to suture that portion of the bladder. As a portion of bone was sticking through a hole in the bladder, he simply pulled over the bladder as best he could, and treated it by siphonage. The man made an excellent recovery. The urethra was kept open by drainage with catheter, and it afterward closed up, a secondary operation becoming necessary. The man has today a good organ. In that particular case, if the transperitoneal route had been adopted, so as to thoroughly open up the bladder and sew up the wound, it might have enhanced the possibilities of recovery, but he got well just the same.

Dr. Mayo (closing the discussion on his part).—Most of the transperitoneal work done for tumors of the bladder has been developed under similar circumstances to those which Dr. Young has described, that is, a secondary operation has been performed either on account of the previous pathological condition, or through the accidental opening of the peritoneum, and measures have been adopted to prevent the septic conditions which might follow this opening of the peritoneum.

As to the question of removal of the bladder, I will not

go into that, although Watson describes the removal of the bladder through the transperitoneal route. He does not open the bladder, but goes through both layers of the peritoneum. In one case I removed the prostate through the same bladder incision. In other cases I have worked through the ordinary suprapubic incision, and, again, I have operated through a large incision such as you would make for the removal of a large tumor in performing hysterectomy.

As to the question brought up by Dr. Bovée, with reference to the method of passing sutures, I have sometimes accidentally opened the bladder, and in other instances, purposely, in the process of doing other abdominal work, have sutured it with catgut, and have never seen any trouble. We know that non-absorbable suture material penetrating the bladder, which remains for a time in the deeper layers, may be the nucleus for the formation of a phosphatic deposit, and we know that other types of permanent suture material will serve as a nucleus for the development of stone if we penetrate all the layers with the suture material. I have never seen a particle of trouble, however, from an absorbable suture like catgut for a chromicized stitch.

Dr. Goldsmith (closing).—I did not make any claim of priority in the matter of closure of the bladder. Dr. Johnston, I think, had reference to the remarks made by Dr. Westmoreland, and I am glad to hear that he had such success twenty years ago. These two papers have stimulated bladder surgery in the matter of tight closure after the removal of foreign bodies such as stones, and also after the removal of tumors.

The only difference between Dr. Mayo and myself is with regard to the method of closure. I use an interrupted suture, and in that way endeavor to have eversion of the mucous membrane of the bladder. I wish to emphasize the remarks made by Dr. Noble, that tight, clean surgical closure of the bladder is a very necessary adjunct to the success of the operation.

Another point I insist on is the importance of an urethral aperture for these cases, and even, in cases of stricture, the performance of an external urethrotomy to minimize in that way further danger of infection.

THE TREATMENT OF FIBROID TUMORS OF THE UTERUS COMPLICATED BY PREGNANCY.

By Lewis S. McMurtry, A.M., M.D.,
Louisville, Ky.

The surgical treatment of uterine fibromyomata has reached such a degree of perfection in the hands of accredited operators, that further improvement must be limited to the special varieties and complications which are presented in this very common class of neoplasms. It is the purpose of this paper to invite attention to one important phase of this subject, which, though considered by many writers briefly and with numerous clinical reports, has not as yet been placed upon the practical basis of uniform and accepted methods of treatment. I allude to the indications for surgical intervention in cases of fibromyomata complicating pregnancy, with especial reference to the time for such intervention and the plan and scope of the operative procedure in the varying conditions presented.

It is well known that uterine fibromyomata are very commonly associated with sterility. Veit estimates that 8 per cent. to 10 per cent. of married women are sterile, but that quite 30 per cent. of married women with uterine fibroids are sterile. Again, the period of greatest fecundity is before the age of thirty-five years, whereas the period at which uterine fibromyomata most frequently occur is after thirty-five. And, moreover, so great are the conservative powers of the pregnant uterus that small tumors in any part of the uterus very rarely inter-

fere with pregnancy and labor; comparatively large tumors in the upper part of the uterus only exceptionally necessitate surgical intervention, and moderately large tumors growing from the lower uterine segment and resting within the true pelvis, do not invariably prove insuperable obstacles to spontaneous delivery at term. From these facts it is an obvious deduction that uterine fibromyomata and pregnancy are only rarely associated, and that surgical intervention will only be necessary in a judiciously selected proportion of cases. In connection with the declaration that pregnancy and uterine fibromyomata are rarely associated the fact must be considered that both pregnancy and uterine fibroids are very common conditions, and the expression "rarely associated" is to be taken relatively. Every surgeon engaged in gynecological work meets with this condition, and the aggregate of such cases is a large number.

Since fibromyomata are composed histologically of the same elements as the uterine wall, they undergo in pregnancy the same change. The tumor, with the entire uterus, has an increased blood supply and active growth. Tumors so insignificant in size as never to have been observed, under the stimulus of pregnancy, grow to appreciable proportions. Growths of moderate size become conspicuous and oppressive as pregnancy advances. The increased vascularity of the uterus begets softening of the tumor, and edema of the tumor is common. Hemorrhage into the tumor has been observed; cystic degeneration and necrosis are changes to which the tumor substance is liable during pregnancy. The growth of the tumor *pari passu*, with the increase in size of the pregnant uterus, accentuates early all the ordinary pressure symptoms of the adjacent viscera, especially as to the bladder and rectum. A subperitoneal fibromyoma, which has become pedunculate, has been observed with twisted pedicle and consequent necrosis as a result of the increased mobility incident to its ascent from the pelvis to the abdomen. This necrosis, as under normal conditions, is more common with submucous

tumors, but may obtain in subserous and interstitial growths also. When the blood supply is reduced during the puerperium, necrosis is more apt to occur. The tumor may so interfere with symmetrical contraction of the uterus, that excessive and even fatal hemorrhage may arise from patency of the uterine sinuses after the placenta is detached.

During the course of pregnancy numerous abnormalities arise from the mechanical effects of the tumor. The uterine end of the Fallopian tube may be so obstructed by the growth that the ovum develops in the tube. In C. P. Noble's statistics of 19 cases of fibroid tumors associated with pregnancy, 6 were ectopic. When the cavity of the fundus is distorted by the growth the ovum and placenta are often implanted low down, in some instances producing placenta previa. Veit states that instead of the head presenting in 95 per cent. of the cases, as attains in normal labors, in pregnancy associated with fibromyomata there are only 54 per cent. of head presentations, with 28 per cent. of breech presentations, and 18 per cent. of transverse presentations, the labor being thus made more hazardous in consequence of the complication. Of course the most serious effect exerted is the obstruction directly to the delivery of the child by the tumor or tumors filling partially or entirely the pelvic cavity. The pain resulting from the abnormal pressure during the latter months of pregnancy, and the moral influence exerted by the woman's knowledge that an abnormality exists, deserve mention in this connection.

It is apparent from these observations that the association of pregnancy with uterine fibromyomata adds very materially to the dangers of this condition; that new dangers will arise from the combination of the two; and while the clinical fact that a considerable proportion of the cases come through in safety is indisputable, the mortality of the entire number of cases left to nature is high. That statistical studies of such surgical subjects as this are misleading, and in great part unobtainable, is well known. Fatal cases are

rarely reported. The mortality of this condition with existing statistics is high, and if all cases treated non-surgically could be obtained the showing would be discouraging indeed. The following extract from the report published by Esch, of Olshausen's clinic, will illustrate the results of obstetrical (non-surgical) and surgical treatment in three illustrative cases:

Case I.—The subserous myoma filled the greater part of the true pelvis and the pouch of Douglas. It was a foot presentation. After a labor lasting two days, the membranes having ruptured, the tumor had risen rendering delivery possible. The baby succumbed on the sixth day to injuries sustained at birth, and the puerperium was complicated by thrombophlebitis with pulmonary embolism on the part of the mother.

Case II.—Eighteen months later the same mother was at term. The child presented by the occiput. By this time the pelvis was entirely occupied by the tumor. After three days of labor without results, a classical Cesarean section was performed. At the same time the myoma was removed from the posterior uterine wall. On the twenty-first day both mother and child were discharged in good condition.

Case III.—The pelvis being filled by subserous immovable myoma, and labor having continued for twenty-four hours without results, Cesarean section with supravaginal amputation of the uterus was done. The child was saved and the mother made an uneventful recovery.[1]

I would call especial attention to the results of delay in the first two cases, and that operation was done in the third case after twenty-four hours of futile waiting on nature.

In further illustration of the advantage of prompt operative intervention in properly selected cases, I desire to offer the following cases from my personal experience:

Case I.—Mrs. T. M. J., of Vincennes, Indiana, aged thirty-two years, was referred to me by her family physician

[1] Zentralbl. f. Gynäk., 1906, vol. xxx, 17.

on October 23, 1907. She was married in June of the present year, and had missed three menstrual periods. The signs and symptoms of pregnancy were manifest. Three weeks previously two indurated tumors were detected on each side of the lower abdomen, the tumor on the right side being larger than the one on the left side. The tumors grew rapidly, and were recognized as fibromyomata of the uterus by the family physician. On examination by the bimanual method it was apparent that the tumors were uterine, the one on the left side being more mobile than that on the opposite side. The tumors were growing from the lower segment of the uterus and were within the true pelvis. On October 25, 1907, I did abdominal section and removed both tumors by myomectomy. Both tumors were subserous; that on the left side of the uterus having a broad pedicle, while the one opposite was sessile. Both were readily removed after incising and separating the peritoneum at the base and suturing with catgut readily arrested the hemorrhage, which was not great, thus completing this part of the operation. There were no other tumors, the uterus being quite normal otherwise. No uterine contraction followed the operation; convalescence was prompt and without untoward incident of any kind, and pregnancy has proceeded in a perfectly normal way up to the present time.

Case II (Abstract).—Mrs. W. E. J., aged thirty-seven years, was referred to me by Dr. T. H. Garvin, of Horse Cave, Ky. The patient was supposed to be in the fifth month of pregnancy, and was very large. The pelvis was packed with an interstitial fibromyoma of the uterus. The cervix could barely be reached by the finger, upon vaginal examination, having been carried up above the pubes. The symptoms of pregnancy were present. The patient was anemic and emaciated, and had suffered for weeks with nausea and pressure symptoms. Abdominal section was done and the entire tumor removed by hysteromyomectomy. After the tumor was removed it was incised and the fetus appeared in

the upper portion of the tumor mass. The convalescence was rather tedious on account of the patient's enfeebled condition, but she made a good recovery and left the hospital quite well at the end of the fourth week.

Case III (Abstract).—Mrs. T. E. W., of Louisville, Ky., was seen with her physician on April 12, 1905. This patient was twenty-eight years of age; had been married nine years; never pregnant until the present, having reached the eighth month of pregnancy when she was delivered of a dead child. The placenta was retained, and when I was called septic symptoms had appeared. Efforts to remove the placenta had failed on account of the presence of the tumor, which was interstitial and occupied the lower portion of the pelvic cavity. Supravaginal hysterectomy was performed, and the patient made a good recovery.

Case IV (Abstract).—Caroline G., a mulatto woman, aged thirty-seven years, of New Albany, Indiana, was referred to me by her physician, February 7, 1904. Patient had known for a year or more that she had an abdominal tumor, which had increased very rapidly since she missed her menstruation six months previous to the date I first saw her. Examination showed her to be in advanced pregnancy with a large multinodular fibromyoma packing the pelvis. On April 5 she was admitted to the infirmary with the first pains of labor. The cervix was above the pubis and beyond reach of the finger. Under chloroform anesthesia, I did abdominal section. The uterus was incised, a female child and placenta were delivered; the uterus contracted promptly. The entire tumor mass with uterus was removed by supravaginal hysterectomy, and the operation completed in the usual way. The mother had an uncomplicated convalescence, and left the infirmary with her child on May 2, which was three weeks and four days after operation.

I have selected these 4 cases as illustrating the multiform aspects of uterine fibromyomata complicated by pregnancy, as clinically presented. My entire experience consists of 2

more cases, in which operation was done in the early period of pregnancy, making 6 cases in all, and all recovered. This is not an exceptional experience, but is about the usual results of operative treatment in the hands of experienced surgeons.

My thesis is that, while indiscriminate operation in uterine fibromyomata associated with pregnancy is not to be advised, the mortality of this condition when unaided is so great as to justify an extension of the field of operative treatment, both myomectomy and hysteromyomectomy; and every case should receive individual consideration so that a judicious selection of cases for operation may be observed.

DISCUSSION.

Dr. George H. Noble, of Atlanta, Ga.—Although it is only a small percentage of fibroid tumors that are complicated with pregnancy, the subject deserves serious consideration. We must look at it from two standpoints: (1) In the interest of the mother, and (2) in the interest of the fetus. If the mother is anxious to go to full term, her wishes should influence the treatment.

In the interest of the mother, one of two things may be done: (1) Evacuation of the uterus when the latter is accessible; (2) hysterectomy.

Evacuation of the uterus is a temporary expedient, and may have to be repeated later, and, therefore, is undesirable.

Hysterectomy is the safest of all procedures for the mother, and is the most radical for it prevents recurrence of the complications of pregnancy. The operation may be done with a great feeling of satisfaction, as the mortality in the hands of accredited surgeons has been reduced to a minimum of 1 per cent. or less. It is the operation of selection when the pelvis is blocked with tumors, or the fetus is lying within a nest of tumors; in the latter circumstance no other plan of treatment is as practical.

Of 109 consecutively successful abdominal hysterectomies for fibroid tumors, I have had 8 or 10 complicated with pregnancy, and 6 of these were such cases as here mentioned.

In the interest of the fetus, we may do, first, myomectomy; second, Cesarean section in selected cases.

When the tumors are either pedunculated, subserous, or situated between the outer and middle muscular layers of the uterus, they may be removed with a fair degree of safety, but, if located between the middle and inner muscular layers of the uterus or are submucous, the danger of miscarriage is great, although it does not hazard the mother's life. I have operated six times, removing tumors about the size of cocoanuts from between the external muscular layers of the uterus, and have had but one miscarriage to occur. This I attributed to the rough handling of an assistant.

Cesarean section is applicable in cases in which the tumors are all located in the lower segment of the uterus, the fundus or body being free, for a uterine incision through a nest of fibroids would be an undesirable thing on account of the increased hemorrhage and retraction of the uterine muscularis, rendering closure of the uterus difficult.

Cesarean section gives the fetus a chance for its life and offers an opportunity for the Porro operation or, preferably, hysterectomy at the time of making the section.

I would like to add I have encountered a complication in these cases that demands immediate attention. It is hemorrhage in the pelvis cavity due to lacerations of adhesions caused by the rapidly growing uterus. In two instances there were small ovarian cysts, about four or five inches in diameter, lying beneath the tumor and adherent to Douglass' pouch and the posterior wall of the broad ligament. The rapidly growing uterus pulled upon the pedicles of the cysts, detaching portions of the adherent tumors, causing serious hemorrhage from large veins, resulting in shock and other marked symptoms of internal hemorrhage. In both instances I found it necessary to do hysterectomy, removing in one a fetus of six months' gestation.

Dr. Herman J. Boldt, of New York City.—I am sure the most excellent paper of Dr. McMurtry interested all of us. There is no question but that the judgment of the particular practitioner is taxed fully as much in cases of pregnancy complicated by uterine fibromata, as in any other gynecological condition. I can best illustrate what I mean by citing an example that I had a few months ago. A woman, at about the third month of gestation, consulted me as to whether or not she was pregnant. She had missed the menstrual period a couple of times, and the physician she first consulted

informed her that she had a tumor which required immediate removal. Upon examination I determined that there was a tumor in the lower anterior segment of the uterus—a fibromyoma of the interstitial variety, and that, at the same time, she was also pregnant. She had been having some pain, but the pain was intermittent. At the time she consulted me I advised to let herself alone, that she go to term, and be delivered by Cesarean section in the event she could not be delivered naturally. Three or four days subsequent to that she again called and told me that she was having quite frequent attacks of labor-like pains. It was evident to me that an abortion was imminent. In this instance I considered that myomectomy, with a view of possibly preventing abortion, should be tried. So far as I know there is not another instance where an abortion was actually in progress and myomectomy decided upon for the prevention of the abortion. She was immediately transferred to the hospital, and, without delay, operated upon. On opening the abdomen the uterine wall over the tumor was split, and the tumor was enucleated. This tumor had caused so much pressure on the uterine body as to separate it into halves. While I was sewing up the abdomen it could be seen resuming its natural contour. To make a long story short the woman made a perfect recovery. She is now in the eighth month of pregnancy, and the abortion was averted.

We must consider in all instances of myomata what may be the outcome if a patient is allowed to go to term. With judicious handling of the uterus it is my firm conviction that there is not so much danger in having an abortion following a myomectomy as was formerly thought to be the case. Take a patient with multiple fibromyomata, and if the delivery is obstructed by the tumors I believe it is bad practice to attempt myomectomy in such cases. I believe that the only conservative operation for the mother is to do a supravaginal or panhysterectomy.

Dr. Henry D. Fry, of Washington, D. C.—In addition to the dangers that Dr. McMurtry has mentioned of labor in these cases, that is, in addition to the frequency of malpresentations, we must recognize the increased danger in these cases from postpartum hemorrhage. The retraction of the uterus at the site of the placental attachment is not sufficient, and there is liability to postpartum hemorrhage; again, if a woman

gets through with her labor satisfactorily and safely, there may be infection and necrosis of the fibroid tumor. I have had that occur twice in my own work, where the women had been delivered safely, and their puerperium was complicated by septic fever. Supravaginal hysterectomy was done, and the women got well. On cutting open the tumor there was found to be disintegration and necrosis.

In regard to the time of operation in these cases of fibroid tumor, I think we ought always, if possible, to tide the patients over until we get the child to the period of viability; get the woman as near full term of gestation as possible, and then do Cesarean section and supravaginal amputation of the uterus. Myomectomy in these cases is only suitable for the subserous fibroid, and only in cases where we can operate before the fourth month of pregnancy. After the development of the musculature of the uterus we will have miscarriage occur in a large percentage of the cases. I have had to do myomectomy under these circumstances, and the labor has come on at the sixth month, three days after the operation, and the woman has aborted. So I should feel the rule would be to do myomectomy for tumors of the subserous variety if you have to operate before the fourth month; if after the fourth month, to let the case go on as long as possible and do Cesarean section and save the child's life, and then do supravaginal hysterectomy. I have done this on four occasions the oldest period of gestation being seven and one-half months. The child did not live. The next was six months, and the earliest three and one-half months. So I would say, that if we cannot operate before the fourth month, to wait and do Cesarean section and amputate the uterus.

Dr. J. Wesley Bovée, of Washington, D. C.—I want to ask that Dr. Lewis be called upon to speak on this subject, as he has had a very large experience.

Dr. Ernest S. Lewis, of New Orleans.—It was my intention to listen to the other members who have had so much experience with fibroids complicating pregnancy, rather than speak myself. I have had cases that I recall, and others that I do not recall, but two have occurred within the past two years and are still fresh in my memory. One of the cases was a woman, five months pregnant, with a fibroid attached to the body of the uterus and filling about one-half of the pelvis. It was not suspected until symptoms and pain from pressure on

the sciatic nerve caused her family physician to be sent for, who was somewhat puzzled at the condition when the examination was made. He asked me to see the case, and I recognized it as a fibroid which could not be pushed above the brim of the pelvis. The cervix was depressed against the symphysis pubis. I advised operation. She was taken to a private hospital; the abdomen was opened and a tumor enucleated from the back portion of the uterus. The abdomen was closed and the patient made an uneventful recovery, went to full term, and was delivered by her family physician without forceps.

The second case was that of a woman advanced in pregnancy. I do not know for what reason, but an examination was made when she was seven months pregnant, and a similar tumor to the one removed in the first case was found occupying the pelvis. I was asked to see the case, which I did, and recognized it as a fibroid, but there were other fibroids, subperitoneal. They were not large, however, and exerted no injurious pressure, so that with the exception of the pressure exerted by the tumor in the pelvis, causing bladder and rectal disturbances, the woman's pregnancy was not complicated. Therefore, I advised that pregnancy be allowed to go to full term. A few days before the end of gestation I had the woman taken to the Charity Hospital, opened her abdomen, performed Cesarean section, removed the fetus, and then did a supravaginal hysterectomy.

I have removed a number of fibroids where pregnancy was not suspected, and I have found upon laying them open that there was a two or three months' pregnancy. I have had women go through labor at term with fibroids situated in the upper part of the uterus, and in one instance I recall during the process of involution these tumors diminished in size two-thirds, so that while this patient suffered from the effects of the fibroids before pregnancy, after the termination of gestation and the involution of the uterus, she was comparatively comfortable.

Dr. Bovée.—I think there are a great many cases in which the women will go on to full term with fibroid tumors of the uterus, and be delivered by natural labor, so that I feel we cannot lay down any fast rule that will apply to every case. It seems to me each one is to be considered individually. On the whole, if anything is to be done, if any intervention is to be undertaken, I think it is well to follow out the plan

that Dr. Fry has mentioned. I am loathe, however, to do myomectomy where the tumor is intimately connected with the body of the uterus. I feel that would be apt to induce abortion.

Dr. Boldt's case impresses me as being quite unique from the fact that the operation was done to prevent abortion, and that abortion did not occur although it was threatened before the operation was done. As a rule I would expect the opposite to be the case. I doubt whether we can follow Dr. Boldt's plan as a routine measure. In a number of cases I have done myomectomy late in pregnancy without interference with the pregnancy. In some of these cases the tumors were large. In one of them the tumor weighed nine pounds, it being a degenerated fibroid. It caused so much pain by its pressure and the infection present, that the woman had to be given large doses of morphine twenty-four hours before the operation. Subsequently she went to full term, and was delivered of a child, and later another.

Where we have a nest of fibroids, whether pedunculated, or whether they are some of the other anatomical varieties of fibroid tumors, the best thing for the mother, as a rule, is that when we have the abdomen open to do a hysterectomy. There are cases where there will be indications toward myomectomy, toward trying to save the procreative life of the mother, but if we could adopt a rule for all cases, hysterectomy would be my choice, so as to remove from the woman all future troubles she might have during subsequent pregnancies.

Dr. George Ben Johnston, of Richmond.—If I should undertake to consider all the complications that may arise in cases of associated fibroids and pregnancy, I would consume all the time allotted for this discussion. The complications are numerous, some of them serious. I agree entirely with the contention that myomectomy can and should be done early in pregnancy in the majority of instances. Unfortunately, however, many of the cases do not reach the surgeon until that period of gestation has passed, when this can be safely done. When a pregnancy complicated by fibroids is known to exist, such a patient should be closely watched in case any condition might arise that demands immediate operation. In this way the rights of the unborn child may be respected, and it is not uncommon for such a pregnancy to go on to the period when the child is viable.

I have had experience in fifteen cases in which I have operated for the removal of fibroids complicating pregnancy, and this series of cases was reported before the Buffalo Academy of Medicine a year ago. One of these cases was exceedingly unique. I should say, however, that my experience has been doleful in the matter of saving the children. I have not had a fatality among the mothers, but I have been able to save only one child out of these fifteen cases. This was a case in which there was a double vagina and a double uterus, with a nest of fibroids in the left uterus, one of which completely filled the pelvis. The woman came under my observation when she was five months pregnant. She was taken to the hospital, where she remained under constant supervision. When gestation was completed I did a Cesarean section on the right uterus and a hysterectomy on the left uterus. The child is alive and well today, and the mother is also in excellent health.

Dr. McMurtry (closing).—There is no field of modern surgery in which results have more closely attained perfection than that of the uterus. In view of the fact the old method of expectancy and non-interference in uterine fibromyomata associated with pregnancy, in vogue so recently as five years ago, should be supplanted by more frequent resort to surgery. I have endeavored to show by clinical results that this is applicable in both early and late periods of pregnancy. In the discussion numerous cases have been added to those reported in my paper to confirm this contention. The case of Dr. Boldt, in which uterine abortion caused by a uterine fibroid was arrested by removal of the tumor, is instructive. With gentle manipulation and refined technique many fibroid tumors can be removed in the early months of pregnancy with as little disturbance of pregnancy as would obtain after the operation for ovarian tumors. When we come to the period of viability the Cesarean section and Porro operation may be applied with results equal to those of hysteromyomectomy under other conditions. With due observance of the conservative indications established in the treatment of uterine fibromyomata with pregnancy, looking especially to the selection of cases, the operations of myomectomy and hysteromyomectomy should have a wider scope than has hitherto been conceded.

RECENT FACTORS IN THE ELUCIDATION OF CHRONIC JOINT DISEASES.

By C. E. Caldwell, M.D.,
Cincinnati.

The greater the variance of teaching on the etiology and pathology of any obscure disease, the nearer are we to its solution. If this apparently paradoxical aphorism have its foundation in truth, as I believe it has, we should be very near the solution of many of the hitherto and, unfortunately, still obscure questions relating to the etiology and pathology of chronic joint diseases. At no time in the history of medicine has there been such activity in this field of research as at present.

In the overwhelming literature of the subject, one hesitates to cite authorities, and in the variety of opinion one is loath to formulate conclusions. It is a far cry from the all comprehensive and dogmatic work of Benjamin Brodie,[1] whose last edition appeared in 1847, to the painstaking and scientific monographs of the past decade relating to single phases of the subject. Even Barwell's[2] classic work, appearing so late as 1881, has been relegated to the lumber-room of obsolete pathology, and fascinating as I found its perusal in my student days, I read it now as a stimulus to more specialized study in the field in which he so magnificently generalized. Under his single caption, "strumous synovitis," what a widely divergent category of diseased conditions must now be included.

Under "some other forms of synovitis" what larger field for speculative specialization.

We are not so prone, as in former years, to formulate theories of disease from our inner consciousness of what those diseases should, in the nature of things, be. But we must still plead guilty to an overzealous adherence to the fetich of formalism, and to an unwillingness to content ourselves with an uncatalogued entity in the domain of pathological findings.

While our forbears spoke of hydrops articuli and ulceration of cartilage as separate diseases, instead of diseased conditions or accompaniments of disease of varying etiology, are we not equally prone to draw too hard and fast lines separating the various gradations between rheumatoid arthritis and arthritis deformans?

Is it not, as a matter of fact, quite as unreasonable for us to formulate an up-to-date category of chronic joint disease in our present uncertain knowledge of the subject, as it was one hundred years ago when methods of scientific investigation were much more primitive?

"The truths of today are the errors of tomorrow" seems particularly applicable to the teachings in regard to chronic joint affections. I have limited this paper to a general survey of the subject, drawing such inferences as may be of practical value. There is no pretence of offering conclusions based on investigations of my own, but rather an effort to disentangle, from the web of recent literature, a few strands which may serve to guide us out of the labyrinth of speculation into the clear field of practical observation. If, in the past, there was a too great readiness to interpret diseased conditions by the light of gross pathological findings, we are in an equal danger today of making clinical facts conform to the speculative spirit of the bacteriological laboratory. We are, if possible, disregarding the personal equation interpreted in terms of individual predisposition too much, and in a too arduous pursuit of the cryptogamic vegetable we totally

ignore the character of the soil in which it grows. Let me not be misinterpreted into an under valuation of anything which laboratory research may contribute to the elucidation of this more than usually obscure subject.

A little more carefully elicited clinical history, a more thoughtfully considered comparison of the anamnesis with the objective findings in a given case, might serve to throw light on much that is obscure.

The history of a long-forgotten gonorrhea, a succession of attacks of follicular tonsillitis, an abortion with subsequent low-grade of endometric infection, a heredity from alcoholized parents on one or both sides, a history of trauma of apparently insignificant character, any of these may serve to clear up an obscure case of joint trouble.

The gross appearances, in a given case, may determine the advisability or non-advisability of operative interference, may have a distinct bearing on the prognosis, but may or may not throw light on the factors which were most active in producing them. The presence of a chronic villous arthritis may mean that there has been an antecedent infection, and it may mean an antecedent trauma, or both.

An atrophic osteoarthritis may depend on a condition of faulty nutrition and disordered metabolism, or upon repeated para-arthritic inflammations of infective nature, or upon both. A hypertrophic osteoarthritis or osteitis deformans may owe its origin to successive traumata, to repeated insults to articular cartilages of enfeebled vitality, or it may have been the result of osteomyelitic infection of low grade and obscure genesis. Almost every day we are confronted with new combinations of the arthritis puzzle.

There is hardly a disease in the category of infections that is not combined in the relation of adjective prefix to the term arthritis. Poor old rheumatism, the refuge of our grandparents, has been forced to go way back and sit down. In its stead have come a troup of youngsters. Polyarthritis rheumatica, atrophica, hypertrophica, villosa; gouty rheu-

matism; typhoid arthritis, influenza arthritis, scarlatinal arthritis, gonorrheal arthritis; arthritis of variola, of measles, of psoriasis, and others too numerous to mention.

Now, of course, it has not been possible to demonstrate in all these cases the specific bacteria of the diseases which stand in a causal relation to these various forms of arthritis. But that such a causative relation does exist is beyond all likelihood of refutation.

But the great question will always be presenting itself: Is there such a thing as individual predisposition, diathesis if you wish so to call it, or do repeated attacks of inflammation, infectious if you like, traumatic in some cases, beget a condition which we are fond of calling diathesis?

Take, for example, gout, which is a fairly typical example of what we call a diathesis. Do repeated attacks of autotoxic arthritis confer the diathesis, or does an inherited diathesis predispose to repeated attacks of arthritis with crystallizations of biurate of sodium, or tophi in the joints? On the other hand, let us take gonorrhea. Here is a disease that affects so large a proportion of our young adult male population, not only once but repeatedly, that it would seem that gonorrheal arthritis should be the rule, rather than the exception, and yet that it is the exception and the rare exception, as compared with the great prevalence of the disease, no one will dispute. Does it not, as a matter of fact, need some other explanation than that of metastasis to account for many of these cases? Is there not often an antecedent or coincident history of injury, cold, or undue exposure, which, combined with that something called individual predisposition, determines in a given case the onset of symptoms? It is a well-known experimental fact that staphylococci of human osteomyelitis introduced into rabbits and guinea-pigs have failed to excite osteomyelitis without a simultaneous traumatizing of the bone of the infected animal.

Of all the larger joints the knee is particularly prone to infective inflammations. Does it not owe this greater vul-

nerability to its greater exposure to trauma and atmospheric influences, as well as to its greater complexity of intrinsic ligaments and synovial folds?

Then, again, is it not true that a so-called gonorrheal rheumatism or gonococcus arthritis usually develops, not during the acute stages of gonorrhea when gonococcus absorption would seem most likely to occur but later on, often when the disease has ceased to bother the patient, when only a gleety discharge remains? In other words, when the patient has begun to resume his old habits and knock around again.

Take, again, the cases of typhoid arthritis or typhoid osteomyelitis, Do they not tend to show themselves often when the typhoid itself has abated? In two cases which came under my personal observation, there was an antecedent history of trauma at the point of development.

If we had some means of studying the progress of these various joint affections, in a fortuitous series of cases, where death has intervened by accident or from some intercurrent affection, it might be possible to arrive at some definite conclusion.

Where the role of infection ceases, and purely trophic conditions begin, or vice versa, is a problem not to be solved in the immediate future. Even where infection has played the principal if not the entire role in these affections, much misunderstanding existed in the past, and for that matter does still, as to which of the numerous joint structures, synovial, ligamentous, cartilaginous or bony, were first affected.

We used to hear a great deal about tuberculosis of the synovial type, and tuberculosis of the osseous type. It is now pretty generally accepted that tuberculous infection of the epiphysis or a true tuberculous osteomyelitis is the primary condition, except in that rarer form of tuberculous polyarthritis described by Poncet, which has received the unfortunate name of tuberculous rheumatism.

We shall arrive at a much better understanding of our cases, individually, when we approach them with an unprejudiced

mind, instead of attempting to make the case conform to a preconceived notion of its proper place in a ready-made category of diseases.

In a clinical lecture on arthritis, Dr. F. J. Poynton[3] says: "I ask you to consider arthritis as a manifestation of diseased states and not as in itself a disease." This, in a few words, has expressed more clearly than anything I could say, where I, myself, stand on this question. Whether approached from an anatomical, a clinical, or bacteriological point of view, this is certainly, at the present time, the sanest view to take of the subject.

Whether of traumatic, infectious, metabolic or autotoxic origin, certain forms of chronic arthritis will present clinical pictures so obscure, so ill-defined, so lacking sharp points of differentiation that it is difficult to place them where they belong. There are certain chronic and subacute joint affections which stand in such an obvious relation of effects to certain infectious causes, that it would seem a supererogation of the critical faculty to question this relation. There are others in which the cause, an infectious one also, but very remote and indefinite, may never enter into the mind of the patient or physician, and yet undoubtedly many cases of so-called rheumatoid arthritis and deforming osteoarthritis are not only the result of infection but owe their continued activity to cryptic vomicæ, be these vomicæ in the root of a tooth, in the tonsil, or in the lung.

It will oftentimes happen that a careful and rigid examination of the patient (it may be with the aid of specialists in other lines) will reveal a hidden and hitherto unsuspected cause of the persistence of obstinate and apparently incurable joint trouble.

That trauma acts not as an exciting cause, but as a predisposing cause in many cases of chronic joint trouble, I am thoroughly convinced. I make the distinction of predisposing, advisedly. The exciting factor in many instances is a superadded infection. In other words, a person with a slight

chronic derangement in a joint, whether it be a partially dislocated meniscus, a torn synovial fold with prolapse of said torn synovial fold between opposing articular surfaces, or an avulsion of a ligament, will often invite to that joint an infection which it might otherwise, in a more healthy condition, escape.

If a sarcoma will often develop at the site of a periosteal trauma, is it not equally conceivable that devastating joint infections may follow upon obscure and often undetected joint lesions? Of the infections, Howard Marsh[4] arranges them under three heads, including under these the acute infections:

1. "Those cases occurring as the result of infected wounds of operative interference, or in the course of acute infectious osteomyelitis or pyemia.

2. "Those occurring in the course of acute infectious fevers, which, by their obvious connection with their cause, have no especial interest.

3. "The class of cases which are caused by every-day agents, such as the streptococcus, gonococcus, and staphylococcus, but in which the symptoms differ so widely from those we are in the habit of associating with these several infections, that the connection is apt to remain undetected."

He cites cases of arthritis due to what he calls the "gonococcus of diminished virulence," noting their similarity to those cases due to tuberculous infection.

Marsh cites a number of cases belonging supposedly to the type of rheumatoid polyarthritis in which obscure foci of infection were discovered, and with their elimination through suitable treatment the cases recovered from their rheumatoid arthritis. Abscess of a tooth, slight and almost unrecognizable chronic gleet, chronic endometritis, and other conditions were mentioned as the exciting causes.

Dr. Borchard[5] cites a number of interesting cases of apparently double-sided hypertropic osteoarthritis of the hip, which on resection and section of the specimens showed

osteomyelitis as the cause of the lipping and cartilage deformities.

Dr. Felix Franke,[6] under the title of "influenza" (knee), adduces a number of cases in support of his belief in the important role which influenza plays in chronic arthritis.

Baer and Rosenheim, quoted by Bloodgood,[7] found a case of spondylitis which was relieved by the removal of a focus of infection in the ethmoidal cells. Bloodgood, himself, observed a case of stiffness and pain in the upper cervical vertebræ which was completely removed by the disinfection of a carious tooth.

I, myself, know of one case of most obstinate arthritis of the knee-joint, of which a cryptic infection of the tonsil was the cause.

For all practical purposes we may divide chronic joint diseases, from an etiological standpoint, into three large classes:

1. Of traumatic origin.
   (*a*) Chronic internal derangements (hydrops articuli).
   (*b*) Chronic inflammatory conditions (arthritis vilossa).
2. Of infectious origin.
   (*a*) Of known origin.
   (*b*) Of unknown or obscure origin.
3. Of metabolic or autotoxic origin.

In the first class, which revelations of the Röntgen ray have demonstrated to be much larger than formerly suspected, we may include those injuries to the joint structures which have resulted from linear fractures into joints, avulsions of tendinous or ligamentous insertions, and incomplete fractures involving injury to cartilages, synovial folds and fringes, and displacement of articular cartilages.

Many cases of intermittent hydrops, chronic villous arthritis, and hypertrophic osteoarthritis, undoubtedly owe their inception to some such cause.

In the second class must be included many cases which have hitherto been included in the category of rheumatic

or rheumatoid conditions. Those in which the infectious element plays a conspicuous and obvious role, are necessarily less interesting than those in which the relation of infection is remote and often with difficulty traceable.

In the third class, owing to the gradual process of exclusion, a fast diminishing class, we shall include such cases as are supposedly due to faulty metabolism, neuropathic cases, and such as are associated with a so-called diathesis.

Under the third class, those of metabolic or autotoxic origin, were formerly included the so-called chronic rheumatisms, rheumatic gout, deforming arthritis, and gout proper.

It has been already shown that many cases of rheumatoid arthritis are distinctly infectious in their origin; it has been equally shown that many cases of osteoarthritis are due to osteomyelitis, others to trauma with superadded infections.

There remains, therefore, in this category only those cases of atrophic osteoarthritis which are of very insidious onset, without fever or other signs of infection, the class which Nathan[8] calls metabolic osteoarthritis, true gouty arthritis, and those of neuropathic origin (Charcot's disease). The last-named, Charcot's disease, is associated with such extensive bone disintegration that the evidence seems more than presumptive that there is present some sort of adventitious infection.

With regard to the various diseases considered from an anatomical standpoint, we have involvement of one or more of the various joint structures.

1. Synovial.
2. Ligamentous.
3. Cartilaginous.
4. Osseous.

Under the first we have chronic synovitis with effusion, hydrops articuli, which may have been the result of trauma, acute effusion, persistence of effusion due to relaxed ligaments and disordered circulation. In many of these cases, owing to the deposition of fibrin from the effused fluid, many

laminæ of organized fibrin may be peeled from the inner surface of the synovial membrane.

Chronic villous arthritis is due to overgrowth of the synovial fringes; oftentimes with formation of adventitious accumulations of fatty tissue, lipoma arborescens; not infrequently with cartilaginous changes, which, being broken off in the joint cavities, constitute the so-called joint mice.

Chronic villous arthritis is often either primarily the result of infection, or infection is subsequently added to a condition having its origin in trauma. The synovial structures were formerly supposed to be primarily infected in many infective joint troubles, where now the bone is admitted to be primarily infected.

The ligaments, especially extrinsic ligaments, are frequently the seat of pariarthritic inflammations, as in rheumatoid arthritis. Frequent inflammatory involvement of the ligaments predisposes to relaxed joints with consequent distortion and deformities, viz., luxation from muscular pull, static deformities as in the foot from superincumbent weight.

Avulsions of intrinsic ligaments, such as the crucial ligaments, may give rise to a whole train of joint complications.

The cartilages are probably rarely the starting point of joint trouble, except when they suffer displacements, as in the case of the menisci. All other cartilaginous changes are secondary. To the bone, on the other hand, that formerly least suspected of joint structures, we must look for the starting point of most chronic joint lesions. Whether it be traumatic, infectious, or atrophic, it is to the bone that we must look for the beginning of the trouble.

All other changes, synovial, ligamentous, and cartilaginous, can be explained in the increasing amount of light that has been recently thrown upon the structural changes in the bone. In the obscure traumatisms of the articular extremities of bone we shall find many explanations of subsequent joint complications, and in infectious osteomyelitis of the epiphysis of long bones we shall find the starting point of many cases of deforming arthritis.

A routine examination of all cases of trauma in the neighborhood of joints will reveal much that has hitherto been suspected. That so little of practical value has up to the present time resulted from bacteriological cultures in the joint affections of more obscure origin, is probably due to the fact, as Seligman suggests, that synovial fluids offer a distinctly inhibitive culture medium and the offending bacteria often succumb to a powerful phagocytic capacity on the part of the wandering leukocytes in the synovial structures. That much in the future will be revealed by a wider applicability of Sir A. Wright's theory of opsonins, is to be hoped.

Up to the present time I have not been able to convince myself, from a review of contemporary literature, of anything of sufficiently practical value to warrant more than a reference to it. Personal experience with it in this class of cases, I must disclaim having had, owing to certain difficulties in obtaining a suitable centrifuge for our laboratory.

In the light of our present knowledge of these cases, it therefore seems desirable in forming a diagnosis to investigate every possible factor which can serve to elucidate a given case.

If there has been a history of trauma, no matter how insignificant, inquiry should be made as to whether there was at the time an *x*-ray photograph taken of the part. Access to such a photograph should be sought where possible, and an attempt made to explain present conditions by past records. If there is a history of gonorrhea, no matter how remote, investigations of the urethra and even milking of the prostate may be necessary to clear up the case.

In women who are the victims of rheumatoid arthritis, curettage of the endometrium may, by removing the exciting cause, cure the disease. The tonsils and the teeth should undergo thorough investigation, and any other occult sources of infection should not be overlooked.

There are many cases of joint trouble so typical that he

who runs may read, but in that large class of chronic joint troubles, which are interesting by virtue of their obscurity, he who reads much may still go very far astray.

REFERENCES.

1. Benjamin Brodie. Diseases of the Joints, 1847.
2. Barwell. Diseases of the Joints, 1881.
3. F. J. Poynton. Medical Press, April 3, 1907.
4. Howard Marsh. British Med. Jour., December 8, 1906.
5. Dr. Borchard. Deutsch Zeitsch. f. Chirurgie, Band lxxxv, p. 74.
6. Dr. Felix Franke. Deutsch Zeitsch. f. Chirurgie, Band lxxxv, p. 335.
7. Bloodgood. Progressive Medicine, December, 1907.
8. Nathan. Amer. Jour. Med. Sci., December, 1906.

DISCUSSION.

DR. ALBERT H. FREIBERG, of Cincinnati.—Dr. Caldwell has presented an interesting subject for our consideration, one which has very manifold aspects. I am sorry to say, however, that Dr. Caldwell has made them no less manifold, because I think he has added another classification, and there are so many of them in existence now. I, for one, am ready to grant many of the points which he has brought out, namely, that we are very often apt to overlook these two elements—trauma on the one hand and infection on the other. Furthermore, I do not believe that we can adhere to any classification which has yet been offered, feeling that we have a scientific classification which will permit of analysis. Therefore, the best thing we can do is to adopt a classification, if there be one, which is a working classification. He does not claim it to be a scientific analysis down to the last point, because there is no scientific analysis down to the last point in the present state of our knowledge. Such a working classification has been given us by Goldthwait, but to which not enough prominence has been given. Goldthwait offers us a classification solely as a working classification, which pays attention to the etiological factor, where we know it is based on the organic changes which have taken place, and pays attention to the etiology wherever it is possible to do so.

Accordingly, he speaks of villous arthritis; a group which he makes too large and makes comprehensive in order to include all those cases of villous hypertrophy in which we do or do not know the cause of the villous hypertrophy. In many of the cases we do not know the cause of the villous hypertrophy. In the second place he speaks of a group of cases of atrophic arthritis, not to include every case in which there is atrophy of bone, or atrophy of the soft parts of the joint, but which he reserves for a clinical picture whose etiology is not clear—a polyarthritis which we know very well, but whose etiological character is exceedingly obscure. Then we have hypertrophic arthritis in which we have the reverse of those conditions, likewise a condition about which there may be some difference of opinion as to the cause or causes. We may favor the theory of auto-intoxication. Dr. Hoke and his associate, Dr. Andrews, have attributed cases of hypertrophic arthritis to putrefactive processes in the alimentary canal, and with good ground in view of the evidence which they furnish. Nevertheless we are not absolutely clear as to the etiology, but we have, without going into detail, in cases of hypertrophic arthritis, a definite clinical picture. We have definite changes in the joints which we recognize. We may have some atrophic changes in the joints, but the clinical picture is sufficiently clear, the pathological changes are sufficiently characteristic to allow of our accepting it as a definite clinical picture, and we know how to use it.

Dr. Caldwell (closing).—In reply to Dr. Freiberg, I will say that there has been no effort made to formulate a new category of diseases, but simply a working arrangement of these diseases. In that connection, with regard to the etiological factor in the production of hypertrophic arthritis and villous arthritis, I will say that recently I saw a review of an article in which the author speaks of the etiological effect of linear fractures of the patella in the production of hypertrophic conditions within the joint. It is conceivable that with such a picture of incomplete fracture of the patella as I have presented, we may have a disturbance of the synovial fringes which results in villous arthritis. If we have superadded infection, that is another thing.

As I have said before, no attempt has been made to make a distinct category of these diseases, but something that we can practically, as surgeons and not as specialists, adopt along this line of work.

THE TREATMENT OF DISLOCATION AT THE SHOULDER-JOINT COMPLICATED BY FRACTURE OF THE UPPER EXTREMITY OF THE HUMERUS.

By J. M. Mason, M.D.,
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My attention has been particularly directed to the above class of injuries by a case of double dislocation of the shoulders, with fracture of the surgical neck of the right humerus, which came under my care in November, 1906. The history of the case is as follows:

K. S., white, male, aged thirty-five years, was knocked from a wagon by a street car and sustained injuries to both shoulders and severe contusions of the left leg. The accident happened at 9 A.M. on November 11, 1906, and I saw him at St. Vincent's Hospital about an hour later. He was suffering greatly, and it was evident from the deformity that he had sustained dislocations of both shoulders. He was anesthetized for further examination and for reduction of the dislocations. The left shoulder was treated first and was easily reduced by the Kocher method. On examining the right shoulder crepitus was at once elicited, and it was found that there was a fracture very high up, as well as a dislocation. Both of the dislocations were of the subcoracoid variety. Attempts were made to reduce the dislocation, but they were unsuccessful. The patient was allowed to come out from under the anesthetic, and the nature of the injury was ex-

explained to him. His consent was secured to perform arthrotomy for reduction of the displacement. After consultation he was again anesthetized at 3 P.M., six hours after the injury, and further efforts to reduce were made. These consisted principally in gentle traction and abduction, together with direct pressure on the head. The attempts failed. The joint was then exposed by the anterior incision, the head was found to be tightly jammed under the coracoid, and a complete transverse fracture of the humerus was found at the surgical neck with a long splinter torn from the shaft. There was a tear in the capsule on its anterior aspect.

The upper fragment was grasped with lion-jawed forceps, but no change in its position could be made. A periosteal elevator was then used and the head was pried back into position with but little difficulty. Before effecting reduction, however, the coracohumeral ligament had to be divided for a few centimeters. During the operation there was a good deal of venous bleeding, but it was not difficult to control with hot compresses.

A hole was drilled through the centre of the lower fragment of the humerus near the line of fracture, and a silver wire was passed through this and tied on the outer side of the bone, thereby binding the splintered portion of the fracture to the shaft. There was very little tendency to displacement of the fractured surfaces in an inward direction, as a periosteal band connected them.

The divided coracohumeral ligament and the rent in the capsule were closed with catgut, and a small gauze drain was carried down to the point of fracture. This drain did not communicate with the joint cavity, as that had been closed. The drain was removed in a few days and the wound healed by first intention. For four weeks the arm was kept on an internal angular splint with shoulder cap.

At the time of the injury the *x*-ray machine at the hospital was out of order, so no pictures were obtained before the operation. A picture taken seven weeks after operation

shows good anatomical result, and the functional result is perfect. There is no restriction of movement in any direction. There is neither atrophy, pain, nor weakness in the arm. The accompanying photographs taken December 1, 1907, give an opportunity of comparing in this patient the results of arthrotomy and reduction of the fracture dislocation on the right side, with that obtained in reduction by the Kocher method of a simple, uncomplicated dislocation on the left side. The movements in each shoulder are as free as they were before the operation, and he has been doing for the last eight months exactly the same work in which he was engaged when he was injured, delivering ice from a wholesale wagon and handling 100-pound ice blocks daily.

The presentation of this subject in most of our surgical text-books is not made, upon the whole, in a manner befitting its gravity and importance. There are, however, notable exceptions. Before the appearance, in 1894, of McBurney's paper describing the use of his hook, very little had been done in the way of successful treatment of these injuries. Too great stress was laid upon efforts to reduce by manipulation, and McBurney cites six cases where death resulted from the violent and persistent efforts which were resorted to in attempting to bring about reduction. Numerous cases are recorded where fracture of the neck of the humerus occurred in attempting the reduction of difficult shoulder dislocations.

The older methods of treating fracture dislocation at the shoulder consisted of:

1. Reduction of the dislocation by manipulation. This should still be practised with gentleness.

2. Securing union in the fracture and then attempting to reduce the dislocation by manipulations, using the reunited shaft of the humerus as a lever. Oger, cited by McBurney, collected all cases treated in this manner, 10 in number, with 7 absolute failures and 3 doubtful successes.[58] The physician who originally treated Royster's first case selected this plan of treatment, and the fracture had united when

Fig. 1

Fig. 2

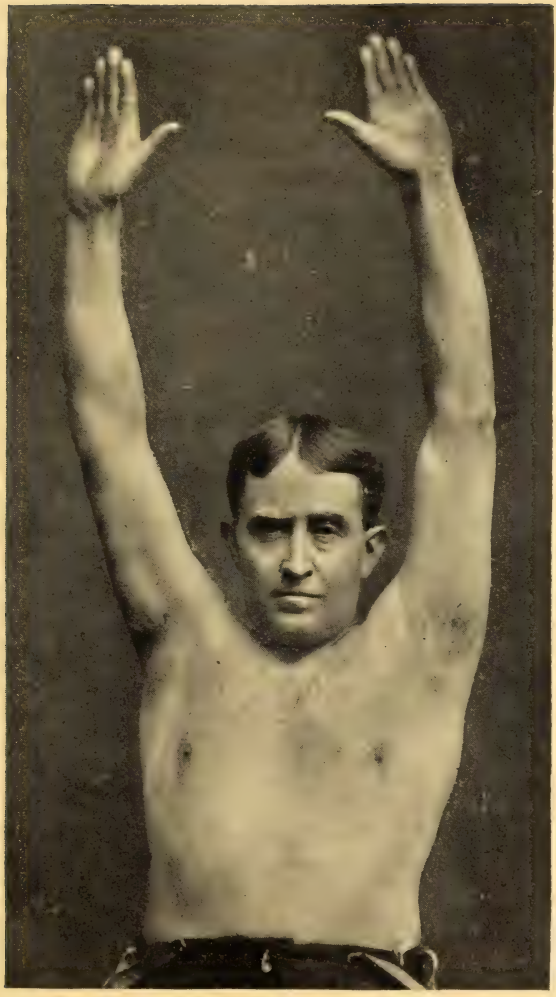

Fig. 3

Fig. 4

Fig. 5

Royster took charge of the case. In attempting to reduce the dislocation, fracture of the humerus occurred.

This method has nothing to commend it, and should be mentioned only to be condemned.

3. The Riberi method. This consisted in beginning early passive motion, with the object of making a false joint at the point of fracture and leaving the dislocation untreated. This method is unworthy of consideration at the present time, unless it might, perhaps, be made use of in an old or debilitated person who could not undergo any sort of operative treatment.

4. Resection. At one time this was offered as an operation of election and is still in many cases, especially those of long standing, the best thing possible. However, as an operative procedure it should be made use of only when reposition cannot be accomplished.

At the present time it is conceded that the best way in which to proceed is to first secure reduction of the dislocation, and then to direct attention to treatment of the fracture.

Arthrotomy. Failing in reasonable attempts to secure reduction of the dislocation by manipulation, sufficient evidence is now at hand to justify us in claiming that immediate arthrotomy with reduction of the dislocation, with or without the use of hooks, followed by suture or reduction and immobilization of fracture, is the ideal method of dealing with this class of cases.

In 1859 Gross wrote: "I should not hesitate if a case of the kind should present itself to me to cut down upon the dislocated bone and push it back into its normal position."[64]

In 1870 Stemen first put this plan into successful operation. In one of our very latest systems of surgery, however, we note "an anesthetic should always be administered and every method should be tried in order to reduce the head before an operation is attempted."[60]

This, to say the least, certainly puts operation on the defensive.

Scudder advises operation in case manipulation fails and says: "If operative interference has been decided upon, it is best to defer operation until acute symptoms have subsided and the damaged tissues have recovered themselves."[61] To this I do not entirely subscribe, for if this teaching is followed it will eliminate immediate operation, which, from reported cases, has given the best results. He advises the operation of McBurney, with use of his hook.

Stimson[62] advocates gentle traction with direct pressure on the head before adopting other measures, and next advises the McBurney operation. Concerning time he says: "I do not condemn the early operation or primary excision when indicated, but I here warn against the tardy early operation, cutting into swollen discolored tissues, about severe injuries, after the second day."[63]

Schoch states that arthrotomy is favored by Vamossy, Nicoladoni, Keuster, Albert, Socin, Trendelenburg, Rose, Schoenborn, Nélaton, von Bergmann, and other European surgeons. A large number of the highest surgical authorities in this country also favor it.

In his review of fractures and dislocations in *Progressive Medicine* for December, 1907, Bloodgood says: "When fracture is associated with dislocation of a fragment including a portion of the head, open incision should be employed if perfect reduction cannot be made."[65] Quoting Schlange, on irreducible fractures and dislocations, he says: "As to dislocations there can be no question—every irreducible dislocation should be subjected to immediate open incision and reduction. The time to operate is at once. The changes that will take place in the joint and its surroundings by delay may be irreparable. There should *be* no old dislocations."[66]

This subject should be presented to every surgeon and to every general practitioner in such a light that he may realize the value of time in the prognosis of his cases.

Many patients come first into the hands of the general practitioner, and the history of nearly all the cases classified

as "old fracture dislocations" is that they received some sort of palliative treatment, or the real nature of the injury was undiscovered until a varying time had elapsed. The general practitioner should realize the gravity of any sort of fracture dislocation or irreducible dislocation of the shoulder, for upon him rests the responsibility of placing his patient in competent surgical hands at once.

While Stemen successfully performed arthrotomy with reduction of dislocation and fracture, in 1870, he did not report his cases until 1893, and we must consider the invention and use of the McBurney hook as the real beginning of operative reductions. In his collection of cases up to 1894, 117 in number, he says: "At least six cases of open operation can be referred to, in every one of which the head was either primarily or secondarily removed."[58] Stemen's cases are not included in his collection.

He considered "arthrotomy a grave operation, which, while it has resulted well in a few cases and has the endorsement of high surgical authority, can possibly never give a perfect functional result."[58]

It was claimed that the use of the hook was superior to open arthrotomy in that the hook could be used with less dissection and disturbance of the tissues, and that it might, in some cases, be used without entering the joint at all. Recorded experiences with the hook do not seem to establish for it any superiority over open arthrotomy. The dislocated head has been reduced many more times by the use of elevators, fingers, and forceps, than has it been by the use of the hook; and there are numerous cases of perfect results after open arthrotomy. Of the 23 cases of arthrotomy in this series only one case was subjected to secondary excision.

So far as I have been able to find, the hook has been used only twelve times, and has failed to reduce the dislocation in six instances. The reported cases are as follows:

Operator.	Cases.	Successful.	Failure.
Bull	1		1
Curtis	1		1
Dandridge	1	1	
Morton	1	1	
Porter	2	1	1
Burger	1		1
Wyeth	1		1
McBurney	3	3	
Brown	1		1
Total	12	6	6

These cases, with the exception of McBurney's first case, are recorded in my tables. Dandridge's case had recurred at the end of a month, and he says: "Either the dislocation had recurred or it had not been reduced."[7]

Upon this showing I do not believe the use of the hook is entitled to the prominence that is given it in the text-books.

McBurney collected from the literature up to 1894, 117 cases of dislocation of the shoulder with fracture of the neck of the humerus. To bring the statistics up to the present time, I have collected, since his report, 63 cases including my own, which gives a total of 180 reported cases.

In my series the fractures have been classed as follows:

	Cases.
Of the surgical neck	37
Of the anatomical neck	26
Total	63

The dislocations are:

	Cases.
Subcoracoid	31
Not stated	19
Subglenoid	11
Subspinous	2
Total	63

Efforts to reduce by manipulation have been successful in 8 cases, of which 3 recurred and 1 was of doubtful success. Failure is recorded in 37 cases, and in 18 it is not stated

that attempts were made to reduce, but it is quite likely that in every case some effort was made to reduce before resorting to operation.

Fracture or refracture occurred in attempting reduction in seven instances.

Taking one month as the arbitrary dividing line between recent and old cases, four tables have been prepared: recent dislocation with fracture at the surgical neck, 28 cases; old dislocation with fracture at the surgical neck, 9 cases; recent dislocation with fracture at the anatomical neck, 13 cases; old dislocation with fracture at the anatomical neck, 13 cases. A table is also appended containing 21 cases of dislocation with fracture of the greater tuberosity.

Summary.

Table 1.—Recent Dislocation, with Fracture at Surgical Neck. Number of Cases, 28.

Treatment.	No.	Result. Good.	Fair.	Impr.	Bad.	Died.	Not stated
Arthrotomy and reduction	18	12	1	1	2	2	
Reduction	4		1	2	1		
Rest and massage	2		1	1			
Excision	4		3			1	
Not stated.	1						1
Total	29	12	6	4	3	3	1

One case is counted twice, primary arthrotomy and reduction Secondary excision.

Table 2.—Old Dislocation, with Fracture at Surgical Neck. Number of Cases, 9.

Treatment.	No.	Result. Good.	Fair.	Impr.	Bad.	Died.	Not stated
Excision	5		1	3			1
Dislocation							
Untreated	2		1		1		
Massage and electricity	1				1		
Riberi method	1				1		
Total	9		2	3	3		1

TABLE 3.—Recent Dislocation, with Fracture at Anatomical Neck. Number of Cases, 13

Treatment.	No.	Result. Good.	Fair.	Impr.	Bad.	Died.	Not stated
Excision	6		3	2		1	
Arthrotomy and reduction	3	1	2				
Reduction	2	1					1
Rest and massage	2			1	1		
Total	13	2	5	3	1	1	1

TABLE 4.—Old Dislocation, with Fracture at Anatomical Neck. Number of Cases, 13.

Treatment.	No.	Result. Good.	Fair.	Impr.	Bad.	Died.	Not stated
Excision	6		2	3			1
Arthrotomy and reduction	2	1					1
Linea arthrotomy and Riberi	1						1
Not clearly stated	4						4
Total	13	1	2	3			7

CONDENSED SUMMARY OF ALL CASES.

All Cases, 64.

Treatment.	No.	Result. Good.	Fair.	Impr.	Bad.	Died.	Not stated
Arthrotomy and reduction	23	14	3	1	2	2	1
Excisions	21		9	10		2	
Reduction by manipulation	6	1	1	2	1		1
Rest and massage	5		1	2	2		
Dislocation was not treated	2		1		1		
Riberi method	2				1		1
Not stated	5						5
Total	64	15	15	15	7	4	8

NOTE.—Table I.—One case counted twice.

Where the fracture has not been confined to one or the other neck, or where the line of fracture has not been clearly

stated, the case has been classed under one of these heads as accurately as possible, taking all the circumstances into consideration.

In making a classification of results I have adopted the plan of Curtis, who says: "In order to obtain an idea of the relative merits of reduction and resection, we must first remember that even the best functional result after resection is not to be compared to the nearly perfect shoulder-joint which can sometimes be obtained by returning the normal head to its natural articulating cavity. The result of a reduction may fall considerably below this perfection and still be as good as the best obtainable by resection. We shall, therefore, classify the results of reduction as good, fair, and bad, and the results of resection as fair, improved, and bad."[6]

From the condensed tables we find 23 cases of arthrotomy with reduction and 14 good results (60.8 per cent.), against 21 resections with 9 fair results (42.8 per cent.). The cases classed as "good" include those where there is practically no impairment of function, and in several instances it is distinctly stated that there was perfect restoration. Those cases of resection classed as "fair" include the best results to be obtained after resection. If no distinction were made and they were also classed as "good," there would still be a large difference in favor of arthrotomy and reduction. The results in Table No. 1, early arthrotomy in dislocation with fracture at the surgical neck, show 18 operations with 12 good results, and to this should be added McBurney's first case, which is not included in my series, making 19 cases with 13 good results (68.5 per cent.). If we combine the results of Tables 1 and 3 and add McBurney's case, we have 22 recent cases with 14 good results (64 per cent.). Let it be borne in mind that the tables of recent cases include everything within the first month after injury, and it will be apparent that a much higher percentage of perfect recoveries would follow if immediate operation were practised in all cases where manipulation failed to reduce.

Dislocation with Fracture at Anatomical Neck. The problem of dealing with dislocation with fracture at the anatomical neck differs in some respects from that encountered when the fracture is at the surgical neck. In either event, delay in reducing the dislocation will make that part of the treatment more difficult. Union of fracture at the anatomical neck is much more apt to fail than when fracture is at the surgical neck. When the fracture is at the anatomical neck and the head is entirely separated, it is cut off from all its blood supply, and while theoretically one would expect it to undergo necrosis if not at once restored, still Gray says: "This must be an exceedingly rare occurrence;" and Gurlt was unable to find a single authenticated case on record.[59]

However, if the head remains detached from the shaft long enough for the ends of the bones to become smoothed over, as was the case with Keen's patient, the upper fragment is too small to permit of freshening the surface as might be done in fracture at the surgical neck, and excision will have to be practised.

For this particular reason I do not agree with the statement of Curtis[6] that a delay of from one to four weeks will not impair the result.

If any infection is introduced in performing arthrotomy the separated head, on account of its poor blood supply, will almost certainly undergo suppuration and necrosis, requiring secondary excision. After reduction the head should be attached to the humerus by suture or nails.

Dislocation Complicated by Fracture of Greater Tuberosity. Dislocation complicated by fracture of the greater tuberosity is an injury that was considered very unusual until the *x*-ray came into general use. Fracture of the tuberosity without associated lesion was thought to be even more rare.

Keen was able to present to the Philadelphia Academy of Surgery, in March, 1907, 23 skiagraphs of this fracture alone

or associated with other injuries. These he collected from the different hospitals of Philadelphia, and at the same time reported a case of dislocation with fracture of the tuberosity where he nailed the tuberosity in place after reducing the dislocation. In going over the literature of dislocations with fracture of the neck of the humerus, I have collected 21 cases of dislocation with fracture of the tuberosity. I have not attempted, however, to make this collection exhaustive, and have only recorded those cases which have come under notice in studying the other subject. The fractured tuberosity is often an obstacle to the reduction of what may appear to be a simple dislocation. With only the tuberosity broken, the humeral shaft is still available as a lever in reducing shoulder dislocation, but the tuberosity frequently becomes detached and is displaced between the head of the humerus and some of the overhanging processes of the scapula, acting as an obstacle to the return of the head of the humerus to the glenoid cavity. If left untreated and displaced, even if the dislocation is reduced, the fragment will either attach itself to the humerus in some abnormal position, thereby impairing some of the motions of the joint, or may be drawn into the capsule and become attached somewhere inside the joint cavity to interfere with the free movements of the shoulder.

Reidel states that he has operated on 15 cases of old irreducible dislocation of the shoulder, and found 14 of them associated with fracture, and only one case uncomplicated. Of the 14 cases, 10 showed fracture of the greater tuberosity.

We see, therefore, that dislocation is often rendered irreducible by the presence of a fractured tuberosity, and that with dislocation reduced and the fracture untreated there is often impairment of the function of the joint. The great value of the *x*-ray in clearing up all injuries of the joint cannot be too strongly urged, and we should employ it in every instance.

TABLE No. 1.—Recent Dislocation, with Fracture at Surgical Neck.

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Hook.	Effect of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success	Failure	Fracture.				
Bull, W. T.[1] 1897	1	April 12, 1896	M	15	S. G.	Arthrotomy. Hook tried, but failed. Head pried into place with periosteal elevator. This case was one of epiphyseal separation. Immobilized.	48 hrs.	Yes	Failed	2 gauze dr. into joint	..	1	..	1	..	Moderate stiffness. Rotation half normal. Abduction ¾ horizontal. Movements of scapula complete a range of motion but a trifle short of that possible on sound side. 8 months.	Fair.
Brown, Geo. S.[2] 1907	2	....	M	50	S. C.	Arthrotomy. Head wrenched back into place. Fragments came together so well it was not necessary to wire. Hook was tried, but pulled out.	48 hrs.	Yes	Failed	Silkworm gut strands	..	..	..	..	1	2 months. As good condition apparently as before injury.	Good.
Lyman, C. B.[4] 1900	3	June 7, 1897	M	42	S. C.	Arthrotomy. Slight pull with forceps on lower end of upper fragment at right angles to body caused reduction. Wired fracture.	7 days	No	....	?	..	1	..	..	..	Complete recovery with good use of arm.	Good.
	4	....	M	35	?	Traction with forceps as above, together with slight rotation and extension caused reduction. Wired fracture.	Immediate	No	....	?	..	1	1	..	..	Complete recovery with good use of arm. Results in both cases as good as seen in simple uncomplicated dislocations.	Good.
Curtis, B. F.[6] 1900	5	December 4, 1895	M	14	S. C.	Arthrotomy. Hook. Bone too soft and hook pulled out. Head replaced by fingers and blunt instruments. Head was in inward rotation, so shaft was rotated inward and wired. One inch resected from lower fragment.	4 wks.	Yes	Failed	....	..	..	..	..	1	3 months. Raises arm 45° without moving scapula. Constantly gaining. Inward rotation greater than normal. Outward rotation limited. Later, improving.	Good.

Dandridge, N. P.[7] 1900	6	October 11, 1897	M	?	S. C.	Arthrotomy. Hook applied; slipped out. Again used and complete reduction seemed to have occurred. Immobilized.	18 days	Yes	Success	Tube	..	1	..	..	1	1 mth. *X*-rays show no change in position of head. Either dislocation had recurred or had not been reduced. Ankylosis.	Bad.
Morton, T. S.K.[8] 1896	7	....	M	74	?	Arthrotomy. Hook used. Pulled out. Again used. Raised head to edge of glenoid. Again pulled out. Finger pressure completed reduction. Wired fracture.	Immediate	Yes	Success	Tube	..	1	1	..	..	Sat up eighth day, died suddenly. Wound clean.	Died.
Williams, H. J.[13] 1896	8	December, 1895	M	48	?	Chloroform. Reduction of dislocation and adjustment of fractures. Five weeks. Ankylosis. Violent manipulation and vigorous passive motion for seven weeks.	Immediate	..	....	....	1(?)	..	..	..	..	12 weeks. Abduction 45°. Forward and backward motion nearly entirely recovered.	Bad.
Monks, G. H.[21] 1896	9	....	M	50	S. G.	Arthrotomy. Could not replace head on account of subscapularis tendon. This was cut. Head excised.	Immediate	..	....	....	..	1	..	..	..	Death on fourth day. Wound clean. Cause unknown.	Died.
Roualet, A.[26] 1901	10	November 18, 1900	M	46	S. C.	Bandage. Massage fifteen days, then movements. New articulation formed.	2 days	..	....	....	..	1	..	..	..	2½ months. Elevation to horizontal. Vertical elevation impossible. Adduction good. Abduction easy to horizontal. Extension and flexion good. 1 year, improved.	Fair.
	11	....	M	39	?	Rest and massage.	8 days	..	....	....	..	1	..	..	..	2½ months. Improved considerably.	Improved.
von Eiselberg.[32] 1902	12	....	..	..	?	Arthrotomy. Reduction. Wired fracture.	Immediate	..	....	....	..	..	..	..	..	The best result.	Good.
Koehler, Wm.[33] 1901	13	April 2, 1901	F	50	S. C.	Anesthesia. Extension with ten-pound weights. Counter-extension upward. Reduction.	Immediate	..	....	....	..	..	..	..	..	7½ months. Movements considerably restricted. Elevation 110°. Ext. rotation almost lost. Int. rotation good. Pain in elbow on moving arm.	Fair.
Schoch, Egon.[34] 1900	14	November 20, 1897	M	39	S. C.	Rest, 14 days. Unsuccessful efforts at reduction. Arthrotomy. Fracture already united. Reduction by elevation and external rotation.	16 days	..	....	Yes	..	1	..	..	..	7 months. Shoulder functions perfectly normal.	Good.
Rouette.[35] 1903	15	October 23, 1902	M	29	S. C.	Resection.	20 days	..	....	Yes	..	1	..	..	1	Can raise arm to horizontal and carry hand to head.	Improved.

TABLE No. 1.—Recent Dislocation, with Fracture at Surgical Neck—(*Continued*).

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Hook.	Effect of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success.	Failure.	Fracture.				
Royster, H. A.[39] 1907	16	November 25, 1905	M	60	S. C.	Arthrotomy. Head replaced without slightest difficulty. No wiring necessary.	4 hrs.	..	....	None	..	..	..	..	1	Perfect. Has as good use of shoulder as he ever had.	Good.
Berger.[41] 1898	17	June 22, 1898	M	32	Backward	Reduced under chloroform.	3 days	..	....	....	1	..	..	..	..	2 months. Motility satisfactory. Edema to elbow. Marked atrophy of deltoid.	Improved.
Stemen, C. B.[44] 1893	18	1870	M	30	?	Arthrotomy. Reduction by grasping bone with lion-jawed forceps. Treated as a compound fracture.	Few hrs.	No	....	Yes	..	1	..	..	..	Good.	Good.
	19	?	?	?	?	Similar case similarly treated, only in this case, which was a few years ago, we used antiseptic precautions and wound healed by first intention.	Recent	..	....	....	..	..	..	..	1	Good.	Good.
Porter, C. B.[42] 1894	20	November 18, 1893	M	54	S. C.	Arthrotomy. Reduction with hook. Loose fragments of bone removed.	9 days	Yes	Success	....	..	1	..	..	..	6 months. As good as before operation.	Good.
1897[43]	21	1896	F	50	?	Arthrotomy. Hook unsuccessful. Biceps tendon divided and head finally replaced. Wired bone. Prolonged suppuration finally required resection.	1 month	Yes	Failed	....	..	1	1	1	..	1 year. Fistulous tracts persist. Can reach head with hand.	Improved.
Brinton, J. H.[49] 1897	22	....	F	?	Backward	Excision.	3 days	..	....	Yes	..	1	..	1	..	2 months. Motions of false joint returning satisfactorily.	Improved.
Berger.[40] 1896	23	....	?	?	S. C.	Arthrotomy. Hooks and levers failed. Replaced by seizing tuberosities with forceps and applying force. Immobilized fracture.	10 days	Yes	Failed	Yes	..	1	..	..	..	3 months. Carries hand to head. Can raise elbow to level of shoulder.	Improved.

Lane, Arbuthnot.[51] 1903	24	....	M	60	S. C.	Wired fracture. Does not mention treatment of dislocation.	Probably recent	..	....	....	..	..	..	..	..	Uneventful progress.	Not stated.
Wohlgemuth, Heinz.[19] 1900	25	....	M	40	S. C.	*X*-rays. Fracture surgical neck, great tuberosity, and whole crista-tuberculi majoris. Anesthetized. Dislocation reduced. Fracture immobilized.	Recent	..	....	....	1	..	..	..	..	Great tuberosity has united further posteriorly on shaft. Ext. rotation almost entirely prevented. Elevation markedly impaired. Abduction 60°.	Improved.
Clutton, H. H.[53] 1894	26	March 30, 1894	M	13	S. C.	Shock caused delay 11 days. Arthrotomy. Head replaced by direct pressure and traction. Drill passed vertically downward from head into lower fragment. Ivory peg inserted. Biceps tendon had to be cut, and was sutured.	11 days	No	....	....	..	1	..	..	..	8 months. All movements of shoulder joint are performed perfectly. Keloid in scar.	Good.
Wyeth, J. A.[55] 1895	27	October 22, 1895	F	45	?	Arthrotomy. Hook inserted in 3 different places. Failed to reduce. Adhesions made reduction impossible. Excision.	2 wks.(?)	Yes	Failed	....	..	1	..	..	..	Death in 21 hours. From history of another injury subsequently obtained and appearance of parts at operation, he believes dislocation occurred one year before. Fracture two weeks before.	Died.
Mason, J. M. 1907	28	November 11, 1906	M	35	S. C.	Efforts to reduce failed. Arthrotomy. Head pried into place with periosteal elevator. Fracture wired.	6 hrs.	No	....	Gauze to point of fracture. Not into joint.	..	1	..	..	1	1 year. Perfect result. No limitation of motion in any direction. No atrophy. No pain. No loss of strength.	Good.

TABLE No. 2.—Old Dislocation, with Fracture at Surgical Neck.

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Hook.	Effect of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed.
											Success.	Failure.	Fracture.				
Lyman, C. B.[4] 1900	1	....	F	42	S. C.	Head displaced for one year, and fibrous union of fracture had occurred. Resected and wired fracture. Intended to treat dislocation later. Patient did not return.	1 year	..	....	....	..	1	..	..	..	3 years. Solid union of fracture. Quite free motion in new position beneath coracoid.	Fair.
Porter, C. B.[30] 1903	2	October 11, 1902	M	?	S. C.	Arthrotomy. Removal of head.	1 month	..	....	....	..	1	..	..	1	1 month. Great improvement. Lifts right arm to horizontal. Fast gaining use of left. A case of double fracture dislocation.	Improved.
	3	October 18, 1902	M	?	S. C.	Arthrotomy. Removal of head.	6 weeks	..	....	....	..	1	..	..	1	.....	Improved.
Dollinger, J.[31] 1902	4	....	?	?	?	Resected head and upper fragment, which had united at right angles.	Old	..	....	....	..	1	..	..	..	No notes.	No notes.
Abrazhanoff, A. A.[36] 1896	5	October 14, 1895	M	62	S. C.	Unsuccessful attempts to reduce by manipulation under ether. Resected head.	7 weeks	..	....	....	..	1	..	..	..	3½ months. Raises arm 45°. Abduction and adduction free. Circumduction limited. No pain. Can lift heavy weights.	Improved.
Royster, H. A.[39] 1907	6	....	F	52	?	Physician failed in efforts to reduce. Decided to wait for union then to attempt reduction. Royster in attempting reduction by Kocher's method refractured. Arthrotomy. Could not replace head. Tried to produce false joint, but fracture reunited.	9 weeks	..	....	....	..	1	1	..	..	Effect of operation was nil.	Bad.

Linon.[50] 1898	7	....	M	45	S. G.	*X*-rays. Head united to outer portion of humerus. Surgical interference not considered. Massage and electricity to try to improve extensive paralysis.	60 days	..	....	....	..	1	..	..	..	3 months. Deltoid greatly improved. Raises arm to horizontal. Can close hands one-half.	Bad.
Ricketts, B. M.[54] 1894	8	April, 1894	M	49	S. C.	Failure to reduce under anesthesia. Rest, 6 weeks. Arthrotomy. Anatomical and surgical necks broken and ununited. Nothing further attempted. Wound closed.	6 weeks	..	....	....	..	1	..	..	..	No notes on functional result. General health improved. Asks, "Should head have been resected at time of attempted arthrotomy?"	Bad.
Royster, H. A.[39] 1907	9	July 19, 1905	?	48	S. C.	Comminuted fracture of upper extremity of humerus. Six separate fragments. Line of fracture through surgical neck and 4 inches down shaft. Removed loose bone and packed cavity to form false joint. (Operation amounted to excision.—J. M. M.)	6½ wks.	..	....	Yes	..	..	..	..	..	2 years. Can use arm for all ordinary purposes, and with assistance of other hand can put it in any position except wide adduction.	Improved.

TABLE No. 3.—Recent Dislocation, with Fracture at Anatomical Neck

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Use of hook.	Effect of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success.	Failure.	Fracture				
Curtis, B. F.[6] 1900	1	March 28, 1899	M	29	S. C.	Arthrotomy. Head entirely outside capsule. Feared necrosis if replaced and newly formed vascular connections disturbed. Head and large part of great tuberosity removed.	21 days	..	....	....	..	..	....	..	1	6 months. Abduction ½ normal. Int. rotation nearly normal. Ext. rotation much limited. Does heavy work, and arm is gaining strength. Some atrophy.	Fair.
	2	September 26, 1899	F	11	S. G.	Arthrotomy. Anterior incision. Head could not be reached. Kocher's posterior incision. Acromion divided. Extension, with pressure on head in front and behind, caused reduction. Bone drill driven deep into head through anterior aspect of shoulder. Left in place twenty days. Acromion wired.	24 hrs.	No	....	None	..	1	....	..	1	Fiftieth day. Abduction 60°; adduction complete. Int. rotation almost normal. Ext. rotation much limited. Anteroposterior movements free. No atrophy. This arm was crooked and partially paralyzed from birth.	Fair.
Gerster, A. G.[9] 1898	3	October 15, 1897	M	47	S. G.	Removal of head.	4 weeks	..	....	Tubes	..	..	....	1	..	Death on fifth day. Reacted poorly from operation, and wound suppurated.	Died.
McBurney, Chas.[10] 1896	4	November 10, 1895	M	28	S. C.	Arthrotomy. Hook. After third pull, head was replaced with assistance of pressure on head. Surfaces met accurately. Sutured with catgut.	1 month	Yes	Successful	Tube 4 days	..	1	Refract. 1	..	1	6 weeks. Good movement in all positions. Strength has returned fully except when arm is at right angles or higher.	Good.

Taylor, Wm.[14] 1901	5	....	M	60	S. C.	Head displaced downward and inward. Also rotated. Fracture through anatomical neck. Also through great tuberosity and two small pieces near lesser tuberosity. Excision.	2 days	..	....	....	..	..	....	..	..	Lower motions of arm perfect. Limitation in upward motions. Has returned to work.	Fair.
Jepson, W.[16] 1900	6	September 30, 1899	M	48	S. C.	Head of bone removed.	Immediate (?)	..	....	....	..	1	....	..	..	Motion of shoulder is good and function of arm seemingly not materially disturbed.	Fair.
Prewett, F. E.[17] 1901	7	....	M	27	?	Head replaced. Fractured surfaces placed in apposition. Three days later dressing changed, as it did not retain fragments in position. Again reduced dislocation and fracture.	24 hrs.	..	....	....	1	..	....	..	..	Perfect result.	Good.
Roualet, Adrien.[26] 1901	8	....	F	23	S. C.	Unsuccessful attempt at reduction on second, ninth, and twentieth days. Further treatment by rest and massage.	9 days	..	....	....	..	1	....	..	..	6 weeks. Had recovered motion of elevation and adduction. Very limited.	Bad.
Clutton, H. H.[47] 1892	9	....	F	61	S. G.	Excision of head and great tuberosity.	8 days	..	....	....	..	1	....	..	..	8 months. Can put hand to mouth, back of head, opposite shoulder, behind back; shoulder rather fixed in raising arm from side.	Improved.
McGraw, Th.[48] 1897	10	....	M	45	S. G.	Fracture through anatomical neck and completely detached in axilla. Second fracture passing from above and in front downward, backward, and outward below tuberosities. Excised.	4 weeks	..	....	....	..	1	....	..	1	13 months. Can lift arm nearly at right angles with body.	Improved.
Delorme.[24] 1899	11	....	?	?	?	Freed head and replaced it.	28 days	..	....	....	..	..	....	..	..	Movements nearly all established.	Fair.
Dunham, M.V.B.[56] 1895	12	1887	M	65	?	Rest and fixation for seven weeks, passive motion.	12 hrs.	..	....	....	..	1	....	..	..	Several months. Does light work not requiring extensive range of motion. Places hand on head. Feeds and dresses himself.	Improved.
Reidel.[38] 1900	13	November 23, 1899	M	60	S. C.	Reposition effected by two pulls on adducted arm. Exact location of fracture not stated.	Few days	..	....	....	1	..	....	..	..	No further notes.	Not noted.

TABLE No. 4.—Old Dislocation, with Fracture at Anatomical Neck.

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Use of hook.	Effect of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success.	Failure.	Fracture.				
Brigham, C. B.[3] 1900	1	December 12, 1899	M	34	S. G.	Excision of head.	5 months	..	....	Tubes	....	1	1	..	1	Immediate cessation of pain. 1 month. Motion very much better than before operation. Improving.	Improved.
Pilcher L.[5] 1901	2	1900	?	?	S. C.	Fracture already consolidated, but head was rotated and displaced. Excised head.	6 weeks	..	....	..	....	..	..	..	..	3 months and 3 weeks. Steady improvement. Can do anything except the movements requiring use of trapezius.	Fair.
Keen, W. W.[60] 1907	3	December 27, 1905	M	60	S. C.	Arthrotomy. Upper end of humerus almost entirely smooth. Hopeless to obtain union. Head completely rotated. Removed.	5½ wks.	..	....	Yes	(?) recurred.	..	..	..	1	13 months. Raises arm ⅔ normal. Atrophy disappearing. Uses arm well in digging, etc.	Improved.
Maxwell, J. P.[15] 1902	4	....	M	29	S. C.	Chloroform on two occasions. Failure to reduce. Excision of head.	5½ wks.	..	....	Yes	....	1	..	..	1	1 year. Rotation fair. Elevation almost vertical. Passes hand behind back.	Fair.
Robert.[23] 1899	5	July 18, 1899	M	?	S. G.	Head disengaged from fibrous tissue, adhesions, etc. Replaced by Forabeuf's forceps. Fracture already united.	55 days.	..	....	..	....	1	..	..	..	No notes.	No notes.
Tansini, I.[25] 1897	6	February 11, 1897	M	?	S. G.	Difficult excision.	3 mths.	..	....	..	....	1	1	..	..	Twenty-eighth day. Able to use left joint.	Improved.
Bousquet.[27] 1895	7	....	F	68	S. G.	Head incased in fibrous cell. Excised by Villor.	1 month	..	....	..	1 recurred	..	..	..	..	No notes.	No notes.
Dollinger, J.[31] 1902	8	....	?	?	?	Performed linear arthrotomy. (?)	Old	..	....	..	....	..	..	..	..	No notes.	No notes.
Royster, H. A.[39] 1907	9	June 19, 1905	M	20	S. C.	Arthrotomy. Healed fracture through anatomical neck. Head replaced with fingers and forceps.	2 months	..	....	Small	1 recurred	..	..	..	1	1 month. Condition almost perfect. Two years. Entirely perfect.	Good.
Reidel,[57] 1899	10	....	..	..	..	Reports operating on 2 cases with total destruction of head, and 2 cases in which head had reunited laterally to shaft. No details.	Old	..	....	..	....	..	..	..	..	Not reported in such a manner that results can be classified.	4 not stated.
	11	....	..	..	..		Old										
	12	....	..	..	..		Old										
	13	....	..	..	..		Old										

TABLE No. 5.—Dislocation, with Fracture of Great Tuberosity.

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Use of hook	Result of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success.	Failure.	Fracture.				
Keen, W.W.[11] 1907	1	February 2, 1907	M	59	S. G.	Immediate reduction under ether. No crepitus felt until after reduction of dislocation. Seventh day fragment was exposed, drawn into position, and nailed with two wire nails. Nails protruded through skin. One removed in two weeks, one in three weeks.	7 days	..	....	Yes	1	..	..	..	1	1 month and 2 days. Passive motion just begun. Little ankylosis.	Improved.
Vaughan, Geo. T.[12] 1903	2	March 21, 1903	M	60	S. C.	Arthrotomy. Bony material found in glenoid cavity. Dissected out. Found to be the detached great tuberosity. Reduction then easily effected by pressure in axilla with adduction on arm.	2 months	..	....	No	..	1	..	..	1	Great relief from pain by removal of pressure in nerves in axilla.	No notes on function. Improved.
Turner, G. I.[13] 1908	3	....	M	38	?	Attempts to reduce under anesthesia on three different occasions failed. No notes on further treatment.	32 days	..	....	....	..	1	..	..	..	No notes.	No notes.
	4	....	M	60	?	Chloroform at end of two and one-half weeks; all attempts to reduce failed; marked crepitus appeared at outer surface of caput humeri while being rotated. No *x*-rays. No further treatment permitted.	2½ wks.	..	....	....	..	1	..	..	..	No notes.	No notes.

TABLE No. 5.—Dislocation, with Fracture of Great Tuberosity—(*Continued*).

Operator and date of report.	Number.	Date of operation.	Sex	Age	Dislocation.	Treatment.	Time.	Use of hook.	Result of hook.	Drainage.	Result of efforts to reduce by manipulation.			Suppuration.	Primary union.	Result.	Result classed as
											Success.	Failure.	Fracture.				
Wohlgemuth, Heinz.[19] 1900	5	....	M	60	S. C.	Immediate reduction. Function did not return properly. Two years later, when seen by W., *x*-rays showed reduction of dislocation, but great tuberosity was located farther upward and outward than it should have been. This caused tuberosity to touch acromion before arm was raised to level of shoulder. Impairment of movement resulted.	2 years	..	....	....	1	..	..	..	..	No notes.	No notes.
Baehr, F.[22] 1898	6	....	F	23	S. G.	Unrecognized for one month. Then reduced (?). Came into hands of B. at end of three and one-half months. *X*-rays showed dislocation and fracture of great tuberosity. No attempts at reduction.	3½ months	..	....	....	1 (?)	..	..	..	..	11 months. All movements except bringing arm over back. This was possible, but difficult.	Improved.
Reclus.[28] 1904	7	....	?	?	S. C.	Attempts at reduction for three days unsuccessful. Eighth day Heitz-Boyer apparatus. The extension caused gradual descent of head. On fourth day of treatment gentle manipulations replaced head. Fracture was reduced at same time.	Immediate	..	....	....	..	..	..	..	..	*X*-rays showed no difference in 2 humeri. No notes on functional result.	No notes.
Dollinger, J.[31] 1902	8	....	?	?	?	Arthrotomy. Tuberosity removed and dislocation reduced.	?	..	....	....	..	1	..	..	..	No notes.	No notes.
Thomsen, H.L.[37] 1904	9	April 30, 1903	M	52	S. C.	Immediate efforts to reduce dislocation failed. *X*-rays showed dislocation and fracture of great tuberosity (eighteenth day). Attempts again failed. Twenty-eighth day, arthrotomy; difficult reposition.	28 days	..	....	....	..	1	..	1	..	Suppuration for 6 weeks caused complete ankylosis. 8 mos. Abduction, 30°; rotation, 15°. Deltoid atrophic.	Bad.

Wattson.[46] 1889	10	....	M	40	S. C.	Arthrotomy. Reduction by leverage with a lithotomy scoop. Removed great tuberosity.	4 weeks	No	....	Yes	..	1	..	..	..	8 months. Very good. Some impairment.	Improved.
McBurney, Chas.[52] 1895	11	October 25, 1894	M	?	S. C.	Incision on outer aspect of shaft two inches below head of humerus. Hook introduced. Second hook in base of spine of scapula. Capsule freed with knife and elevator. Reduction accomplished. Fracture of great tuberosity, with formation of new bone which struck edge of glenoid, prevented reduction.	7 weeks	Yes	Success	....	..	1	..	..	..	6 weeks. Gradually considerable motion has been obtained, and there is no doubt but that the arm will become very useful.	Improved.
Reidel.[57] 1899	12	January 8, 1899	M	51	?	Arthrotomy. Great tuberosity fractured, displaced downward, and reunited laterally to shaft. Head replaced. Great tuberosity chiselled off. Wounds left unsutured.	11 days	..	....	Yes	..	1	..	..	..	10 years. Arm strong, motion in joint without crepitus forward and backward, 30° to 40°; outward, 10°; rotation minimal.	Improved.
	13	1891	M	30	Axillary	Great tuberosity torn off. Lesser tuberosity partly so. Both occupied glenoid cavity. Humeral head in axilla. Tuberosities adherent below head. Head replaced and tuberosities and exostoses removed.	5 weeks	..	....	....	..	1	..	..	..	8 years. Works equally well with both arms. Abduction, 45°; with scapula, 90°. Forward elevation beyond horizontal. Posterior elevation equals that of well side. Rotation slight. All motion creates some friction.	Fair.
	14	March 31, 1898	?	?	?	In each case great tuberosity fractured and displaced forward and re-attached to shaft. In each case tuberosity removed and head replaced.	Old	..	....	....	..	1	..	..	..	Each case complete ankylosis.	Bad.
	15	June 13, 1898	?	?	?	Wounds packed.	....	..	....	....	..	1					
	16	....	..	..	....	No details of these cases except that he operated. Fracture of great tuberosity was associated with fracture of the lesser tuberosity in 5 cases.	Old	..	....	....	..	1	..	..	..	.....	5, no notes. 1 died of hemorrhage.
	17	....	..	..	....			..	....	....	..	1	..	..	..		
	18	....	..	..	....			..	....	....	..	1	..	..	..		
	19	....	..	..	....			..	....	....	..	1	..	..	..		
	20	....	..	..	....			..	....	....	..	1	..	..	..		
	21	....	..	..	....			..	....	....	..	1	..	..	..		

The histories of the 21 cases in my series show the following treatment and results:

TREATMENT OF DISLOCATION.

Treatment.	No.	Result.					
		Good.	Fair.	Impr.	Bad.	Died.	Not stated
Reduction . . .	2			1			1
Arthrotomy and reduction . . .	9		1	5	3		
Left unreduced . .	3						3
Reduced by Heintz-Boyer apparatus .	1						1
Not clearly stated .	6					1	5
Total . . .	21		1	6	3	1	10

TREATMENT OF FRACTURED TUBEROSITY.

Nailed in position	1
Removed	7
Untreated	4
Replaced in using Heintz-Boyer apparatus	1
Not stated	8
Total	21

In early cases the dislocation should be reduced by manipulation, if this can be accomplished with gentleness, and the tuberosity should be treated by nailing into position as Keen recommends.

If this is impossible, reduction of the dislocation should be accomplished by arthrotomy and the tuberosity should be nailed into its proper place. Removal should be practised if the fragment cannot be placed. In old cases it will be necessary to perform arthrotomy, remove exostoses and tuberosities united in abnormal positions, and then to reduce the dislocation.

DISLOCATION WITH CRUSHING OF WHOLE OF UPPER EXTREMITY OF HUMERUS. In those injuries where the whole upper extremity of the humerus is crushed, no general plan of treatment can be laid down, and the judgment of the operator must dictate the plan of procedure.

Excision gives, oftentimes, very useful arms, and is to be preferred to allowing the cases to go on to possible ankylosis with excessive callus thrown out around badly displaced fragments.

CONCLUSIONS.

1. Every dislocation of the shoulder associated with fracture of the upper extremity of the humerus is a grave injury, and is likely to result in serious impairment of function if not promptly treated.

2. Every such injury should be subjected to *x*-ray examination for accuracy in diagnosis.

3. Gentleness should characterize all manipulative efforts at reduction, and these should never be carried to the point of bruising or lacerating the tissues.

4. Excision should only be practised when reduction by open arthrotomy has failed or where there is extensive comminution of the upper extremity of the humerus, or where, in fracture of the anatomical neck, the condition of the upper fragment does not justify a reasonable expectancy of uniting.

5. After reduction the broken greater tuberosity should be nailed down if the case is recent, and should be removed if it causes impairment of function in an old case.

6. Failing to reduce by manipulation, immediate arthrotomy with reduction of the dislocation, followed by appropriate treatment for the fracture, has given the best results, and is the ideal method of treatment.

7 Rigid asepsis is essential in securing good results, and these operations should not be undertaken where this cannot be carried out.

NOTE.—Reidel's 14 cases are reported in such a manner that they can hardly be classified under any of my headings, so the following is abstracted from his excellent paper. He operated 15 times where reposition could not be accomplished, and found that 14 of the cases had sustained fracture at the same time. In some there was total destruction of the dislocated head; 2 cases, fractured head of the humerus, had

united laterally to the shaft; the greater tuberosity was torn off alone in 4 cases, associated with fracture of the lesser tuberosity in 6 cases. In all cases (fractured tuberosity) large, bony protuberances had formed owing to periosteal proliferation. He treated 7 of the 15 cases by primary resection. All terminated favorably except 1, aged seventy years, who died from hemorrhage on the sixth day. He mentions that 4 of 9 operative repositions failed and had to be followed by secondary excision In 5 cases operative reposition was successful; 1 case was not complicated by fracture.

(Some of his work must have been a good many years ago, as one of the cases he reports was operated on in 1889, and he seems to have gotten a considerable amount of suppuration. Reference to his paper shows that he treated many of his cases by packing, and in some instances states that the wounds were not sutured. His open treatment was inducive to adhesions and ankylosis, and it is not surprising that he had some very poor results. It must be remembered, too, that he was dealing with old cases, and more extensive operative work was necessary than in recent cases.)

References

1. W. T. Bull. Fracture with Dislocation of the Humerus Treated by Arthrotomy. Annals of Surgery, 1897, vol. xxv, pp. 362, 363.

2. George S. Brown. Personal Communication, November, 1907.

3. C. B. Brigham. Dislocation at the Shoulder Complicated by a Fracture through the Anatomical Neck of the Humerus. Annals of Surgery, 1900, vol. xxxi, pp. 614–616.

4. C. B. Lyman. Dislocation of the Humerus Complicated by Fracture at or near the Surgical Neck. Annals of Surgery, 1900, vol. xxxii, pp. 543–551.

5. L. S. Pilcher. Result of Arthrotomy for old Dislocation of the Humerus, with Fracture of the Neck. Brooklyn Med. Jour., 1901, vol. xv, pp. 34–36.

6. B F. Curtis. Fracture of the Neck of the Humerus, with Dislocation of the Upper Fragment, with a Report of Three Cases Treated by Operation. Annals of Surgery, 1900, vol. xxxi, pp. 291–310.

7. N. P. Dandridge. Dislocation of Humerus, with Fracture of Upper Part of Shaft. Trans. Southern Surg. and Gyn. Assoc., 1900, vol. xiii, pp. 331–333.

8. T. S. K. Morton. Fracture Dislocation of the Shoulder Reduced by McBurney's Hook-taction Method. Annals of Surgery, 1896, vol. xxiii, pp. 756, 757.

9. A. G. Gerster. Fracture of Anatomical Neck of Humerus, with Luxation of Head into Axilla. Annals of Surgery, 1898, vol. xxvii, p. 660.

10. C. McBurney. The Reduction of Dislocation of the Humerus, Complicated by Fracture at the Anatomical Neck. Annals of Surgery, 1896, vol. xxiii, pp. 501–509.

11. W. W. Keen. Fracture of the Greater Tuberosity of the Humerus with Dislocation of Humerus into the Axilla. Immediate Reduction of the Dislocation; on Seventh day Nailing of Fragment of Tuberosity in Place. Annals of Surgery, 1907, vol. xlv, pp. 938–949.

12. Geo. T. Vaughan. The Treatment of Anterior Dislocation of the Shoulder, with Report of a Case in which Reduction was Prevented by the Detached Greater Tuberosity. Jour. Assoc. Military Surgeons, U. S., 1904, vol. xiv, pp. 289–291; Medical News, New York, 1903, vol. lxxxiii, pp. 1083, 1084.

13. H. J. Williams. Five Cases of dislocation and Fracture of the Shoulder. Railway Surg., Chicago, 1896–7, vol. iii, pp. 154, 155.

14. W. Taylor. Dislocation of the Humerus Complicated with Fracture of the Neck of the Bone. Dublin Jour. Med. Sci., 1901, vol. cxi, pp. 330–335.

15. J. P. Maxwell. A Case of Intracapsular Fracture Dislocation of the Humerus. Operation. St. Bartholomew's Hospital Rep., 1902, vol. xxxviii, pp. 33–36.

16. W. Jepson. What Should be our Treatment of Fracture of the Anatomical Neck of the Humerus Complicated by the Dislocation of the Head? Trans. West. Surg. and Gyn. Assoc., 1899, pp. 159–168; West. Med. Review, Lincoln, Neb., 1900, vol. v, pp. 297–300.

17. F. E. Prewitt. A Case of Dislocation of the Head of the Humerus, with Fracture at its Anatomical Neck. Interstate Med. Jour., St. Louis, 1901, vol. viii, p. 61.

18. G. I. Turner. Ueber Luxatio Humeri anterior und complication derselben durch Abreissung des Tuberculum majus. Allg. med. Centr. Ztg., Berlin, 1902, vol. lxxi, pp. 309–323.

19. Heinz Wohlgemuth. Die Fractur des Tuberculum majus Humeri Verhandl. d. deutsch. Gesellsch. f. Chir., 1900, xxix, Congr., pp 375–389.

20. C. B. Porter. Double Dislocation of the Humerus, with Fracture of the Surgical Neck of Each. Boston Med. and Surg. Jour., 1903, vol. cxlviii, p. 367.

21. G. H. Monks. A Case of Fracture of the Upper End of the Humerus Just Below the Tuberosities, with Dislocation of the Head of the Bone into the Axilla. Boston Med. and Surg. Jour., 1896, vol. cxxxiv, p. 138.

22. Ferdinand Baehr. Irreponierte Luxatio axillaris. Fractur des Tuberculum majus mit vollkommener Function. Deutsche Ztschr. f. Chir., Leipzig, 1898, vol. xlvii, pp. 270–272.

23. Robert. Fracture du col anatomique avec luxation ou glitssment de la tete humerale dahs l'aisselle. Bull. et mem. Soc. de Chir. de Paris, 1899, n. s., vol. xxv, pp. 781–788.

24. Delorme. Case Reported in Discussion of Robert's Case above cited.

25. I. Tansini. Lussazione antica dell'omero irreducible frattura del collo anatomico; resezione della testa dell'omero; guarigione Riforma med., Napoli, 1897, vol. xiii, pt. 2, p. 173.

26. A. Roualet. Contribution a l'atude du traitement des luxations de l'epaule compliquees des, fractures de l'extremite superieur de l'humerus. Thèse, Lyon, 1901, No. 43.

27. Bousquet. Luxation de l'epaule compliquee de fracture du col anatomique de l'humerus. Bull. Soc d'anat. et de physiol., Bordeaux, 1895, vol. xvi, pp. 70, 71.

28. Reclus. Luxation de la tete humeral sous la clavicle, compliquee d'une fracture de la grosse tuberosite. Soc. de chir. de Paris, 1904, n. s., vol. xxx, pp. 1105–1108.

29. L. Richon. Luxation de l'epaule gauche avec fracture intra-articulaire de la tete de l'humerus. Arch. de méd. et pharm. mil., Paris, 1903, vol. xli, pp. 453–458.

30. L. Paolucci. Lussazione frattura e resezione dell'omero. Rassegna med., Bologna, 1896, vol. iv, pt. 12, pp. 2–7.

31. J. Dollinger. Meine Method zür blutigen Reposition veralteter Schulterverrenkungen. Centralbl. f. Chir., 1902, vol. xxix, pp. 1277–1280.

32. von Eiselberg. Case Reported in Discussion of Dollinger's paper.

33. W. Koehler. Ueber einen Fall von Schulterverrenkung mit gleicnzeitigen Torsionsbrushes des Oberarms. Diss. 1901, 8°, Kiel.

34. Egan Schoch. Die rreponibeln Schulterluxationen und ihre blutige Behandlung. Bietr. z. klin. Chir. Tubingen, 1900, vol. xxix, pp. 103–127.

35. Rouette. Luxation ancienne de l'epaule compliquee de fracture; resection. Lyon med., 1903, vol. c, pp. 767–769.

36. A. A. Abrazhanoff. Excision of Head in Irreducible Dislocation of Humerus (Russian text). Lietop. russk. chir., St. Petersburg, 1896, vol. i, pp. 1070–1072.

37. H. L. Thomsen. Ueber irreponible Schultergelenks luxationen mit besonderer Beruchsichigung der von Dollinger angegebenen Behandlungsmethode. Diss. Frieburg, 1904.

38. Reidel. Nachtrag zum Aufsatze. Ueber blutige und unblutige Reposition der luxatio anterior Humeri. Heilkunde, Wien, vol. iv, pp 204, 205.

39. H. A. Royster. The Management of Dislocation at the Shoulder, Complicated by Fracture of the Neck of the Humerus. Jour. Amer Med. Assoc., vol. xlix, pp. 487–491.

40. Berger. Arthrotomie pour une luxation intracoracoidienne de l'humerus compliquee de fracture de l'extremite superieure de cet os. Bull et mem. Soc. de chir. de Paris, n. s., 1896, vol. xxii, pp. 215, 216.

41. Berger. Des luxations de l'epaule compliquees de fractures de. l'extremite superieore de l'humerus. Bull. med. Paris, 1898, vol. xii, pp. 913–916.

42. C. B. Porter. Trans. Amer. Surg. Assoc., 1894, vol. xii, p. 287; abstracted by Souchon. See reference No. 44.

43 C. B. Porter. Private Communication to Souchon. See reference No. 44.

44. Edmond Souchon. Operative Treatment of Irreducible Dislocation of the Shoulder-joint, Recent or Old, Simple or Complicated. Trans. Amer. Surg. Assoc., 1897, vol. xv, pp. 311–442.

45. C. B. Stemen. Journal of Medical Sciences, Fort Wayne, Ind., 1893, vol. xiii, pp. 170, 171. Abstracted by Souchon. See reference No. 44.

46. Wattson-McLauren. Edinburgh Med. and Surg. Jour., 1889; abstracted by Souchon. See reference No. 44.

47. H. H. Clutton. Trans. Path. Soc., London, 1892, vol. xliv, No. 3, p. 128.

48. T. A. McGraw. Private Communication to Souchon, March, 1897. See reference No. 44.

49. J. H. Brinton. Private Communication to Souchon, 1897. See reference No. 44.

50. Linon. Observation de luxation sous-glenoidiene ancienne irreducible avec fracture du col chirurgical et consolidation vicieuse. Bull. et mem. Soc. de Chir de Paris, 1898, n. s., vol. xxiv, pp. 1062–1066.

51. Arbuthnot Lane. Fractured Dislocation of the Upper End of the Humerus. Med. Press. and Circ., London, 1903, n. s., vol. lxxv, pp. 142–144.

52. Chas. McBurney. Chronic Dislocation of the Shoulder with Fracture Reduced by Hooks. Annals of Surgery, 1895, vol. xxi, pp. 299–301.

53. H. H. Clutton. Dislocation of the Humerus, with Fracture at the Surgiacl Neck. Lancet, London, November 17, 1894, vol. ii, p. 1156; Trans. Med. Soc., London, 1894, vol. xviii, pp. 366, 367.

54. B. Merrill Ricketts. Dislocation and Double Fracture of the Upper Third of the Humerus. Jour. Amer. Med. Assoc., September 8, 1894, vol. xxiii, pp. 392, 393.

55. John A. Wyeth. Dislocation of the Right Shoulder-joint, Complicated with Fracture Just Above the Deltoid Insertion. New York Polyclinic, November 15, 1895, vol. vi, pp. 325, 326.

56. M. V. B. Dunham. Report of a Case of Intracapsular Fracture of the Humerus, with Dislocation. Yale Med. Jour., New Haven, Conn., January, 1895, vol. i, pp. 103–108.

57. Reidel. Ueber blutige und unblutige Reposition der Luxatio anterior Humeri. Heilkunde, Wien, October, 1899, vol. iv, pp. 4–10.

58. Chas. McBurney and Chas. N. Dowd. Dislocation of the Humerus Complicated by Fracture at or near the Surgical Neck, with a New Method of Reduction. Annals of Surgery, 1894, vol xix, pp. 399–415

59. Gray's Anatomy. Fifteenth edition, p. 149.

60. Keen's Surgery, 1907, vol. ii, p. 404.

61. Chas. L. Scudder. The Treatment of Fractures. Third edition, 1902, pp. 146, 147.

62. Lewis A. Stimson. A Practical Treatise on Fractures and Dislocations. Third edition, 1900

63. Lewis A. Stimson. Private Communication to Souchon, 1897, and published by Souchon. See reference No. 44.

64. Samuel D. Gross. System of Surgery, 1859, vol. ii, p. 194.

65. Joseph C. Bloodgood. Progressive Medicine, December, 1907, vol. ix, No. 4., pp. 153, 154.

66. W. W. Keen. Fracture at the Anatomical Neck of the Humerus and Dislocation of the Head into the Axilla, with Fracture of the Shaft; Difficult removal of the Head of the Humerus. Annals of Surgery, vol. xlv, pp. 945–949

FRACTURE OF THE FEMUR IN FORCIBLE DELIVERY, WITH PRESENTATION OF A SPLINT.

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The possibility of fracture of the femur in the various manipulations of the lower extremities in forcible delivery, is referred to in a few of the standard books on obstetrics. So far as I have been able to ascertain, after a somewhat careful investigation conducted by myself and others, this is the most that is given on this condition in medical literature.

It was my misfortune to have this accident happen in a case conducted by myself, and in discussing it with several local physicians I was able to learn of five other cases. When the amount of strain which has frequently to be placed on these small bones is considered, we would readily conclude what appears to be proven by the very meagre inquiry conducted by myself, that this accident is by no means as infrequent as the slight attention paid to it would indicate. As regards treatment, I have been unable to find any suggestion of any method, and yet the difficulties presented are quite serious.

In the case which I have to report, the presentation was by the breech, the spine lying left anterior. The mother had been in labor two days and had only been able to bring the breech to the lower strait of the pelvis, when she became completely exhausted and the pains of no avail. It, therefore, became

necessary to deliver by traction, and I called in my colleague, Dr. D. J. Coleman, Professor of Obstetrics, who agreed as to the necessity for this step and suggested, as the groin could be reached, that traction should be made by the finger hooked over the anterior groin. While this was being done the femur suddenly snapped. Delivery was completed without further accident than a slight laceration of the perineum.

In the treatment of such a fracture a number of points must be considered. It is absolutely necessary to adopt some method that will permit handling of the child for nursing without disturbing the limb, that will permit changing of napkins, that will not become soiled, and that will not excoriate the delicate skin. These indications cannot be met by any of the methods in vogue for treatment in older persons. The following methods were considered and discarded for various reasons: The long lateral splint is not satisfactory even in adults, because it does not prevent angulation and shortening. It would be extremely difficult to fix the fragments of the femur encased in soft, thick muscles. The Bradford frame might be used with bands placed to fix the limb, but it holds the limb in extension, which is abnormal in infants and must result, for obvious reasons, in extreme angulation.

Buck's extension cannot be applied to such a small individual, and the child cannot be moved for nursing at the breast.

Vertical extension would prevent handling or nursing at the breast.

Plaster of Paris is heavy, apt to become soiled and excoriate the skin, and would be extremely difficult to apply in an infant to produce a satisfactory result.

Some method, then, to which these objections could not apply and which would meet the various indications, became necessary, and the splint which I present, and which is the one used in the case reported, was the final result of my efforts. It is simple, easily constructed, and yet I think meets every indication.

It is made of stout wire, such as is used on the street for telephones, and while it can be bent with plyers is sufficiently rigid to keep its shape. A splint should be constructed for each case, so as to conform to the proper measurements. In constructing it, it passes across the back at the level of the lower angle of the scapula, commencing on the sound side. It is then bent to run along the posterior lateral aspect of the body to the great trochanter on the affected side, then bent upward to correspond to the line of the femur, the thigh being bent at little more than right angles to the body, which is the natural position for an infant and which at the same time secures the greatest relaxation of muscles and best apposition of fragments, and then carried to just above the knee, then bent in a horizontal direction and carried about two inches beyond the foot, when it is curved around and brought back on the other side of the leg in a loop until it reaches the knee, when it is bent outward to pass in front of the sound thigh and to extend to the posterior lateral line of the body just above the anterior superior spine, and then bent along this line and carried to meet the end of wire commencing the splint.

The splint is fixed to the body with a binder of stout canton flannel, which is made double at the back so that that portion of the splint may be slipped between the folds. It should fit snugly, and the binder is kept from slipping off the splint by adhesive plaster which adheres to the binder and is continued around the bar of the splint, one on either side. The binder is fastened in front with safety pins. This gives a very firm and satisfactory base for the splint. The leg rests between the bars of the loop bent around it, and is supported by a hammock made of canton flannel. This is sewed over the bar on the inner side, the outer side being left free and fixed over the outer bar with small safety pins. The hammock is adjusted so that when the leg is held firmly in it, which is done with a roller bandage, there will be some traction on the femur. When it becomes slack it can be easily tightened and

repinned. The up-and-down motion of the knee can be prevented by bands of adhesive plaster passed before and behind the thigh and attached to the vertical bars of the splint. Coaptation splints are difficult to use and inefficient. In actual practice I found the splint as described, light; it did not excoriate the skin or become soiled, and the only point of pressure was at the transverse bar running across the back, and this was prevented by padding with absorbent cotton. The child was easily handled and nursed, and was able to take its airing.

The result secured was perfect as regards function, and, anatomically, without angulation or shortening. A radiograph taken while the splint was still on showed a slight over-riding, but perfect alignment of the femur, and another taken at six months shows a femur without angulation or deformity of any sort.

I was anxious to compare this result with other methods, and had radiographs taken of two cases, one of which had received no treatment and the other treated with apparatus. Both showed marked angulation and deformity, although function was excellent in the case treated with apparatus.

FIG. 1.—Splint with binder and hammock attached.

Fig. 2.—Splint applied to infant.

Fig. 3.—*X*-ray showing fracture in case reported and splint applied.

FIG. 4.—X-ray showing result at age of six months. The over-riding shown in Fig. 3 was completely reduced, and the two limbs are identical.

IMPROVED HODGEN SPLINT FOR THE TREATMENT OF FRACTURES OF THE THIGH OR OTHER PAINFUL AFFECTIONS OF THE LOWER EXTREMITY.

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The Hodgen splint was a modification of Smith's anterior splint. The Smith anterior consisted of a stiff wire frame, bound to the anterior aspect of the thigh and leg, and was used chiefly for suspension. Hodgen widened the space between the side-bars of this splint so that the limb could drop between, and, pinning the encircling turns of roller bandage to the side-bars of the frame, cut away that portion of these turns which covered the front, and used the underlapping portions as a hammock to support the limb. As his intention was to use this modified splint for extension as well as suspension, he adopted the adhesive strips and foot-block of Buck to fix the limb in the splint.

Although a few good articles have been written on this subject for the journals, the text-books, as a rule, have given it very little space. With the exception of the very excellent article by H. H. Mudd, in Park's *Surgery*, they have usually printed the picture of it, saying nothing at all of the principle, of its action, nor application.

Another reason for the general neglect of this useful appliance is the difficulty of conveying, in written words, an adequate idea of its usefulness, or, indeed, of making the

application of it clear. The chief reason, however, for it being so often abandoned after one trial is that the splint, as used by Hodgen, and as at present pictured in the text-books (Fig. 1), is troublesome to understand and adjust, and difficult to keep in order. Those surgeons who have used it with my modifications have, I believe, continued to do so.

It is used by all the surgeons and general practitioners of our city, and at least six of these have had wide experience as internes in many of the large hospitals in the East, and were trained to use different methods. They unite in saying they have never seen any method give such uniformly good results as they get from this.

Although I have been able to interest a number of surgeons over the country through short journal articles, from time to time, during the last ten years, and some others by actual demonstration, I hope that the more elaborate illustrations and more minute explanations of this paper will further the more general adoption which I am sure this very useful appliance deserves. It should, at least, lead to a fair trial of it when it is generally admitted that there is, at present, no treatment for fracture of the thigh that is anything like satisfactory—none, at least, that can be used by the surgeons, occasional surgeons, and general practitioners, who in the nature of things are compelled to treat the majority of these cases.

The principle of the Hodgen splint is to suspend the limb from the bed and to utilize the weight of the limb in making the extension. When the limb is suspended the bed is rolled toward the wall at its head until the suspension cord is at sufficient angle, and then the foot of the bed is elevated on blocks. When this is done the cord is pulling upward and away from the body, while the weight of the limb is pulling directly downward toward the bed; the resultant pull will be between the two or away from the body (the counterextension, or fixed point) toward the foot of the bed in a horizontal direction. The amount of the pull depends

upon the weight of the limb and the angle of the suspension cord; the direction of the pull is always horizontal, but always in line with the swaying suspension cord. This principle I have found to be of easier application and adjustment with the following changes I have made in the splint:

1. As the underlapping strips of roller bandage would continually roll up in strings and cut the patient's skin, and otherwise get out of order, and as they were clearly merely a survival of the roller bandage of Smith, I substituted one piece of cloth as a hammock. In order to keep this hammock taut, I fastened the four corners of it to the loops at the upper and lower corners of the frame to be described later.

2. I substituted four leather straps for the two supporting cords. These straps had holes close together, so that by shifting the buckles the lengths could be adjusted nicely. At the suggestion of my friend, Dr. Perkins, of New Orleans, I later replaced these straps with the small cords and tent-blocks, as being better and cheaper.

3. In the endeavor to find some means of measuring the amount of the traction applied, I placed a cheap spring-scales on the end of the suspension cord and on the hook of this hung the four small cords. I found that it answered another useful purpose in giving a very comfortable jigger or elasticity to the pull.

Lastly. While retaining the traction adhesive strips I have done away with the foot-block of Buck. The application, adjustment, and maintenance of this splint are simple; and I hope the following detailed description of it may not appear too complicated.

Fig. 2 shows the frame of the splint. It is made of $\frac{3}{16}$ inch iron rod, or No. 4 wire, all in one piece except for the arch "J," which regulates the width of the upper end of the hammock. Making this frame "rights and lefts" by making one side longer than the other is not necessary. Some have made this frame of adjustable length, but such invariably get out of order and are more complicated and expensive

by far than this simplified one, that any tinner can make to measure in half an hour.

The loops a a at the proximal end are for the accommodation of the hook-ends of the arch "J," and also to afford a place through which to fasten the upper corners of the hammock cloth to keep it from slipping downward toward the knee. The width of the distal or foot-end of the frame is usually about five inches, and each corner is equipped with an upright loop of stiff wire (b b) two inches high and soldered tightly to the corners. These loops afford anchorage for the lower corners of the hammock, and keep it from slipping up toward the knee. They also take the place of the foot-block by affording a place through which the muslin ends of the traction strips can be passed and tied opposite the sole of the foot. Four short wire loops or rings are fastened to the upper aspect of the side bars of the frame in the positions indicated by c c c c. For small, medium, and large-sized adults the upper two of these rings will be almost always about seven inches from the level of the perineum; and the two distal ones should be about fourteen to sixteen inches toward the foot, from the upper ones, or about twenty-one or twenty-two inches from the perineum. With these rings in these positions it does not matter if the frame extends some distance beyond the foot. The frame should be slightly bent at the level of the knee before it is applied. With the four small side-rings soldered tightly in the places indicated, a stock of three frames will cover all cases. The frame should be at least two inches longer than the limb, but will answer as well if it is four to six inches longer. The wire rings, c c c c, are for the attachment of the four small supporting cords, equipped with the tent-blocks d d d d. These small supporting cords should be made of hard, plaited cord, one-eighth inch thick, that will not stretch; but if this cannot be had the ordinary trot-line "staging" will do. The small tent-blocks should be made of hard wood, that will not split, one-third inch thick, three-fourths inch wide, and two inches

long, with a hole one-half inch from either end. The cord is passed through this hole and knotted; then the other end of the cord is passed through the hole at the other end in the reverse direction and tied in the wire loop "a," thus leaving a loop in the cord above the tent-block which is to hang with its fellow son the hook of the spring-scales "E." This is attached to the suspension sash cord and large tent-block "F," which are hung from the pulley-wheel in the ceiling.

Fig. 3 shows the frame, with the hammock "H" attached to one side. This cloth is cut at each of the four corners and the cut corners pinned through the loops to keep the hammock taut; it is also cut two or three inches deep at the sites c c c c, for the accommodation of the small rings. It is made to fit the under surface of the limb by adjusting the safety-pins along the outer bar of the frame. The hammock is best made of light canvas or heavy unbleached muslin; and if there are wounds to be dressed, one end or the other can be unpinned and turned back out of the way while the remaining portion supports the limb. If the wound is at the knee the cloth can be in three parts, so that while the middle one is removed or tucked back the thigh and leg portions will support the limb.

Fig. 4 shows the splint being applied to a simple fracture of the thigh anywhere from the condyles to the anatomical neck. The whole limb is cleaned and shaved and a two- or three-inch width of zinc oxide plaster is applied to either side, from two inches above the knee, along the leg, to two inches below the malleoli. These two inches are then folded back and stuck on itself opposite the malleoli. To these folded ends of the plaster traction-strips we then pin about a foot of stout muslin roller of the same width, with two strong safety-pins. These muslin ends k k are, later on, to be passed through the distal loops b b and tied opposite the sole of the foot, thus fixing the limb in the splint and doing away with the foot-block. If the limb is of large size the

zinc oxide adhesive strips may be made double thick, and should always be reinforced by a muslin roller up to the knee.

The leg having been equipped with the adhesive strips as just described, the surgeon now leans over the foot of the bed, and, steadying himself against it, takes the patient's foot in one hand and his calf in the other, and straightens the limb out on a pillow. He holds it there with a gently maintained pull, just sufficient to oppose the muscular spasms of the thigh muscles. The assistant now takes the splint, to which has been attached the hammock and the four small supporting cords with their small tent-blocks, and, as the surgeon (still keeping up steady traction) gently lifts the limb an inch or two from the bed, slips it under and hooks in place the arch "J." The surgeon now allows the limb to rest upon the hammock with the pillow underneath, and, while still maintaining a steadying pull with the hand which grasps the foot, with the other hand he pushes the splint well up against the perineum while the assistant passes the muslin ends of the traction strips "k k" through the loops "b b" and ties them in a bow knot opposite the sole of the foot, as the whole is shown in Fig. 5. (Note: Unfortunately the patient used for illustration in Figs. 4 and 5 had a plaster dressing on a sprained ankle; this has nothing to do with our appliance, the Hodgen splint.)

The surgeon now relinquishes the foot to the assistant, and, gathering up the four small supporting cords, he loops them over the hook of the spring-scales "E" on the end of the suspension sash-cord "F," which has previously been passed over the pulley-wheel in the ceiling and equipped with the large tent-block. He then grasps the spring-scales with one hand and the large tent-block with the other, and, by gently lifting the one and pulling down the other, the limb is raised from the bed. When he releases his hold the large tent-block "pinches" and the whole remains suspended.

The safety-pins, fastening the hammock of the inner bar of the frame, having already been adjusted evenly and per-

manently, the pins along the outer bar are next readjusted, one at a time, to make the hammock fit the contour of the under side of the whole length of the limb. If necessary now, the frame is again pushed up against the perineum and the traction-strips "k k" re-tied (again in a bow-knot) opposite the sole. The small cords and tent-blocks, "d d d d" are next readjusted until the limb hangs level.

Next the eversion is now overcorrected by slightly shortening up the two small supporting cords "d d" on the *outer* bar of the frame, and by rotating the limb inward and propping it there with rolls of cotton between it and the outer bar, at the ankle, calf, knee, and the thigh below the fracture. The bed is now moved gently on its rollers until the suspension-cord hangs exactly perpendicular and the weight of the whole noted, as indicated on the spring-scales (Fig. 6).

Traction is applied now by simply rolling the bed toward the wall at its head until the suspension sash-cord is at an angle of from 20 to 30 degrees from the perpendicular. The rollers should now be removed from the foot-legs of the bed and they should be elevated on heavy blocks from six to ten inches high. These blocks should have holes in the top an inch deep for the legs of the foot of the bed to rest in, and prevent them from slipping off. These blocks should also be smooth on the bottom, so that they will slide over the floor with a slight effort to admit of easy adjustment of the position of the bed from time to time.

It will be noted now that the spring-scales indicate an increase in the weight on them; the difference between this and the weight noted when the cord was perpendicular will be, approximately, the amount of traction being exerted. The angle of the suspension-cord and the elevation of the foot of the bed should be varied according to the weight of the patient and his limb. From a child of eight years up to a patient weighing 200 pounds, the net pull will vary from five to twelve pounds.

Long, flat, half-filled sand-bags, weighing from two to six

pounds, laid on the uncovered anterior aspect of the thigh will be found to serve two very useful purposes, *i. e.*, they will add weight to the limb thereby increasing the pull, and by their weight also they will control the muscular spasm, which is otherwise troublesome during the first week. Finally the foot of the bed should be pushed aside a few inches, so that the injured limb will be pulled in a slight degree of abduction. This final position is shown in Fig. 7.

When the principles of this splint are understood and appreciated, the application of it will be found simple, and the nice adjustment of it to the many different conditions to which it is applicable, substantial and efficient. This, however, was not true of the old splint of Hodgen. In the *cuts* of the old splint in the *text-books*, the swing and limb *hang perfectly:* when, as a matter of *fact*, one defect alone renders it impossible to adjust it so that it will ever hang level. This is the absence of the small tent-blocks; when these blocks are not used the weight of the leg sags down and tilts forward the lower fragment of a fractured thigh, *owing to the fact that the weight of the leg from the knee down is greater than the weight of the thigh from the knee up to the fracture.* This can be perfectly regulated in the improved splint, while in the old one these cords could not be regulated at all without letting the limb down on the pillow, and even then the lift could not be shifted from the leg to the thigh, or vice versa. It is most important to apply this splint in a manner that will be at once simple, substantial, and cheap; or rather, I mean by the latter, it can be better made if one follows the plan I have developed of making each part to be assembled, such as can be made or bought for a few cents at the village hardware store. These articles are: the wire or iron frame, made by the tinner; fifteen feet of sash-cord, one and one-quarter yards of light-weight canvas, one ball cotton "staging," two dozen safety-pins, one spring-scales, one screw pulley-wheel, adhesive plaster and roller bandage, and the tent-blocks.

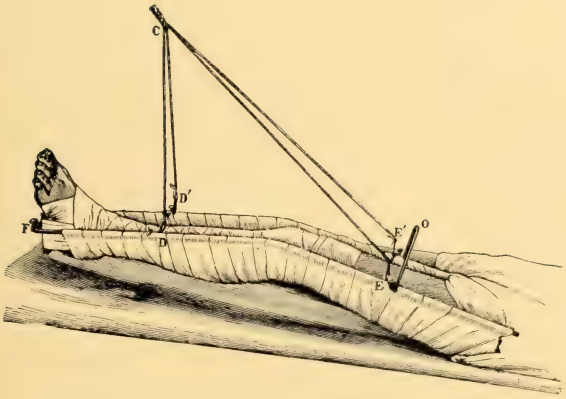

FIG. 1.—Original Hodgen suspension splint

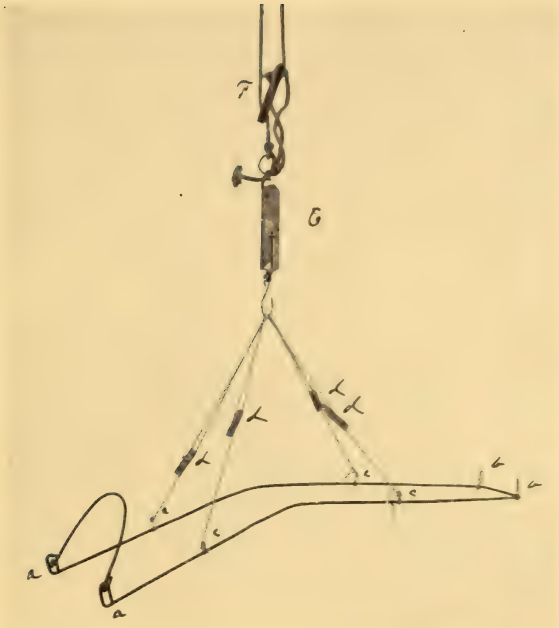

Fig. 2

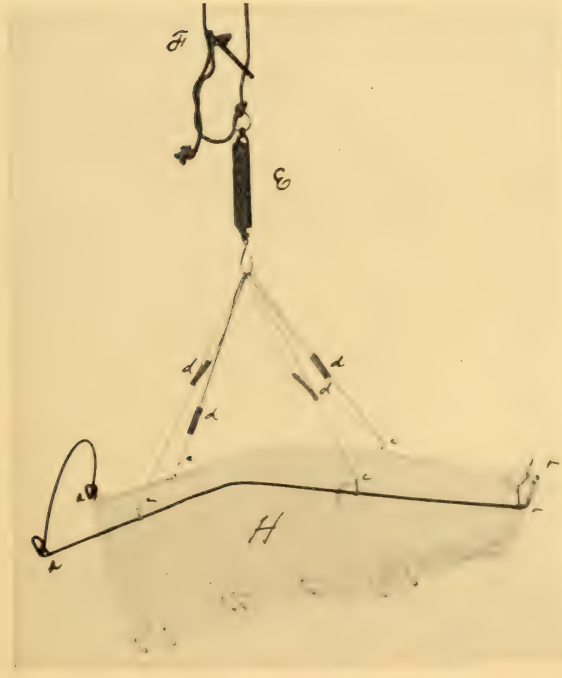

Fig. 3

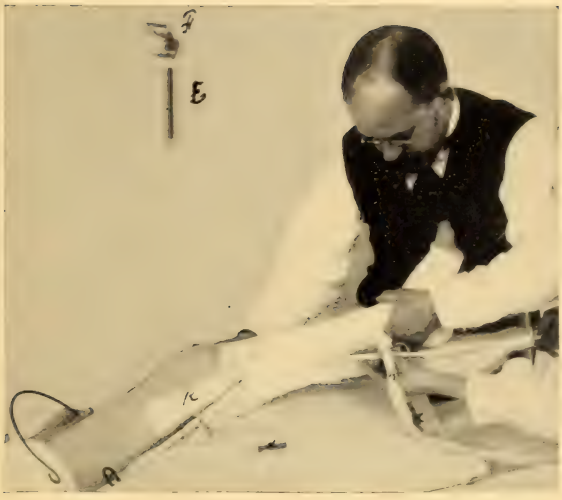

FIG. 4

FIG. 5

Fig. 6

Fig. 7

Figs. 8 and 9

Fig. 10.—Case 2. Paul D., aged seven years, fell from a tree on his feet and fractured both thighs about the middle third. Treated with two Hodgen splints. Limbs exactly the same length. Skiagraph taken six months after injury

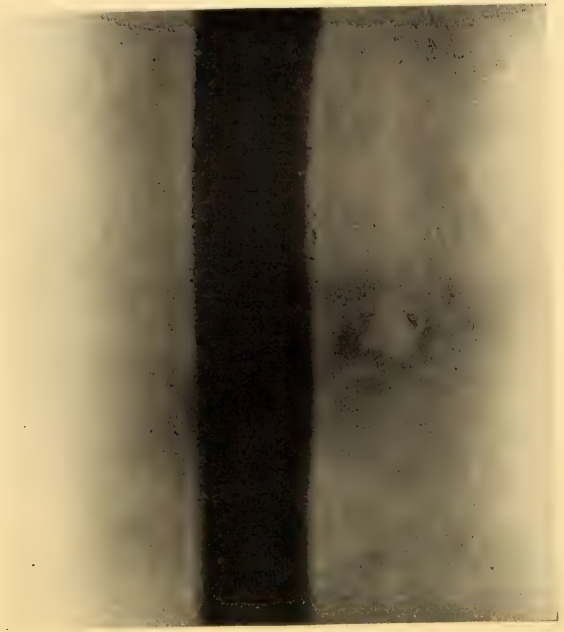

FIG. 11.—Case 3. A. S., aged eighteen years. Had fracture of left thigh in middle third nine years ago at the age of nine. Hodgen splint. No shortening or deformity. Side view. Anteroposterior view does not locate the site of injury.

FIG. 12.—Case 4. J. W. Simple fracture of middle third, eight years ago. Skiagraph of two weeks ago shows perfect result, and patient claims limb is longer than before.

Fig. 13.—Case 6. J. L., aged thirty-five years, was thrown from a horse and fractured right thigh through the trochanter. When first seen, foot was in extreme eversion and the limb was three inches short. Fracture diagnosticated and demonstrated under chloroform but not with *x*-rays. Above taken one year after injury. No shortening whatever.

Fig. 14.—Case 8. Badly combined fracture of middle third, thirteen days after injury. Strong traction being made and limb being held as straight as possible while skiagraph was taken.

Fig. 15.—W. G., aged fifty-six years. Compound comminuted complicated shattering of the condyles of both femurs; knee-joints torn widely and filled with mud; both patellar tendons cut through. Cleansed, repaired, and swung up in Hodgen splint.

The frame should be made in the simple manner I have indicated, as all adjustable screws and telescoping improvements are difficult to keep in order, or, I should say, impossible to keep in order, because they will rust when not in use, or will get bent and will not telescope, besides which they are unnecessary. This splint, like all other splints, should be made on the spot; though the frame can be thrown in a closet and taken out rusty ten years later, it will be found just as serviceable as it was at first, and at a small cost of time and money the other simple items can be got together new. The splint can be put up *substantially*, just as cheaply and as easily as it can be put up *unsubstantially*. Care should be taken that the adhesive strips do not stretch, that the cords will not break nor stretch, and that the tent-blocks will not split and that the cords, passing through them, will pinch and not slip. It is not necessary that the outer bar of the frame be longer than the inner, thus making the splint "rights and lefts" and allowing the upper edge of the hammock to follow the gluteal fold and support the upper fragment even in fractures of the neck, *as the fracture is always sufficiently supported without this by the tension of the muscles when the traction is applied.*

Figs. 8 and 9 will illustrate my meaning: a piece of broom-handle, cut through obliquely to represent an oblique fracture of the thigh, with rubber bands attached to represent the muscles. The fragments overlap when the muscles are contracted, and when the overlapping is pulled out the muscles give a very decided splinting support to the fragments.

This is always sufficient support for simple fractures in this splint, because, in addition, the muscles are, in turn, well supported by the hammock, and, owing to the fact that the ligaments of the hip-joint are non-resistant, there is little or no disturbance of the seat of fracture by any ordinary movements of the patient's limb or body. *With every movement of the limb or body the limb and splint swing, as a*

whole, between the ligaments of the hip-joint and the suspension-rope, and so automatically adjusts itself that the seat of fracture is not disturbed by any reasonable excursions the patient may make over the bed in attending to his daily wants and conveniences. What little movement occurs at the seat of fracture probably hastens the formation of the callus.

The suspension-cord should never be swung to any attachment on the bed itself, because then the angle of the pull cannot be increased nor diminished to amount to anything; neither should it be hung from a frame that is unsteady and not high enough. This splint seems to be the one surgical appliance that can be better used in a private residence than in a modern hospital, because in the former a screw pulley-wheel can be put in the ceiling. In some hospitals this will not be permitted; and in others it is not possible, because the ceiling is made of concrete. In such case the surgeon's ingenuity must provide some means of suspension that will be steady and substantial and have a height above the bed of six or eight feet, though ten or twelve would be better. The longer the suspension-rope the less the pull required. This fact is not easy to explain, unless it is that the wider range of swaying motion, with the angle of the cord much less, gives a teasing pull from side to side, that is more effective than a steady straightaway pull that is much harder—much as the rocking, swaying pull of the obstetrical forceps will effect more than the dead-straight pull. If the suspension-cord is only two feet long above the bed, and while at an angle of 30 degrees shows by the scales that there is a pull on the thigh of ten pounds, increasing the length of this cord to ten feet without altering the angle, will not increase the pull, as shown by the spring-scales, but will increase it in effectiveness fully 100 per cent. That is, the ten pounds shown by the scales with the rope ten feet long will give a more effective pull in the way of reducing the shortening than if the ten pounds shown when the rope is two feet long were increased to twenty, either by adding sand-bags to the weight

of the limb or by rolling the bed until the angle is so acute the scales will show that much increase. With a short cord the pull must be greater to be equally effective, and the patient's movements are more restricted; he gets tired, the pull worries and hurts him, and he will finally allow himself to slip down in the bed until the foot-end of the splint rests against the foot of the bed, in order to get rest from the painful pull and the cramped position. On the other hand, if the rope is long enough the patient is not made uncomfortable, hence his coöperation can always be had for the asking. Indeed, he soon learns that what the surgeon is trying to put in operation for the good of his limb is also the most comfortable. When a fracture of the thigh is put up in the manner described, with the suspension-cord at least six feet long, with the knee slightly flexed (the natural angle assumed when the limb is at rest), with the soft jigger of the spring-scales materially helping to neutralize the small shocks and jars, the patient is made absolutely comfortable, and maintains the greatest pull ever needed with this splint (ten or twelve pounds) without complaint. The patient is comfortable because he has great liberty of movement, because there is no tension of the ham-string muscles, and because the pull of ten or twelve pounds is so distributed it is not noticeable at any one place.

In Buck's extension a pull of from eighteen to twenty-five pounds is necessary, because the *friction of the limb on the bed* has first to be overcome before there is any pull on the muscles of the thigh; while in the Hodgen *bed, the limb is resting in, goes along with it, and so the friction very materially lessens the pull on the traction adhesive strips instead of increasing it.* Again, in Buck's the whole *twenty* pounds of pull falls on the straightened-out ham-string tendons; while in our splint, of the total pull of ten pounds, at least three-quarters of it is taken off the traction-strips by the friction of the limb in the hammock.

On account of the pull of Buck's being painful, the patient

is always resorting to all kinds of shifty devices to have the pull interrupted. He will beg some friend to have mercy on him, and put the weight up on a chair or the bed, where it is very common for the surgeon to find it. Or, again, he will actually allow his heel to dig into the mattress until a slough takes place, rather than endure the agony of the pull. (Note: A surgical friend told me recently that he never used anything but Buck's, and that he overcame my well-founded objections to it by putting on twenty-five pounds and then for two weeks giving the patient all the morphine he wanted to keep him so easy that he would have no inclination to interfere with the pull. At the end of two weeks he puts on a heavy plaster dressing after the manner of Whitman. His results were only fair.)

When, with his pain-stimulated endeavor, the patient succeeds in interrupting the pull in any of these ways, the thigh muscles recover their activity, and in this lies one of the important principles to be respected, if we hope to get these patients well without shortening. In order to pull out all the overlapping that takes place in an oblique fracture of the thigh, the powerful thigh muscles must be put out of commission—temporarily paralyzed—by prolonged and uninterrupted moderate extension, rather than temporary violent extension or prolonged severe but interrupted extension. In Buck's these interruptions will constantly occur, in spite of every care, unless the patient's pain is constantly relieved with morphine. In the Hodgen, as long as the limb is suspended and the cord at an angle, the pull is as constant as the law of gravitation, and it will not be interrupted because the patient is comfortable and has no desire to interrupt it. If the suspension-cord is very short, the pull is straighter and the patient is more confined, and the weight of the pull has to be greatly increased. Under these careless conditions the patient is made uncomfortable and evinces the same tendencies as the patient in Buck's, and allows the splint to rest comfortably against the foot of the bed. Hodgen's

suspension-cord can be shortened until it acts upon much the same principle as Buck's. Even with the shortest cord, however, it is not nearly so painful; the results are better and the patient has more liberty and no bedsores. During the first week in the Hodgen splint, the patient is very much interested in avoiding the painful spasms of the thigh muscles, and actually finds a pleasure in pulling up in the bed and increasing the traction, because he knows that is the surest way of avoiding them. After the first he keeps himself pulled-up because he has formed the habit, because the surgeon advises him to do so, and because he finds it more convenient in every way. These patients sit up in bed from the first to eat, write, bathe, and use the bed-pan, and when they lie down they can turn almost one-quarter of the way to either side. If it has been substantially applied, it is almost automatic in its action and does not require one-quarter the amount of attention from doctors and nurses necessary in other methods.

Of the three principles involved, or, rather, of the three objects to be attained in the treatment of simple fracture of the femur, all are met perfectly by the proper use of this splint. These are: (1) The avoidance of shortening; (2) the avoidance of angulation, and (3) the avoidance of rotation, which is practically always eversion of the foot. The two first are disposed of when we have pulled out all the overlapping; as the shortest distance between two points is a straight line, of course there can be no angulation when there is no shortening; and with this splint shortening can be eliminated in all cases. The constancy of the traction causes a rapid atrophy of the thigh muscles, and the very moderate pull of eight or ten pounds, in a patient of medium adult size, will pull out all the overlapping in ten or twelve days; and by reason of the uncovered thigh and the rapid atrophy of the muscles, the formation of the callus can be followed from day to day by the fingers. Owing to the slight irritation of the seat of the fracture the callus

formation is, I am sure, more rapid than with other methods of treatment. Usually by the end of the third week, if by neglect the shortening has not been all pulled out, I have found it impossible to do so after this. In contrast to this, one case fell into my hands that had had on a plaster splint four weeks. When this was cut off there was found to be four inches shortening. I put him in the Hodgen purely as an experiment, and by extra weighting the limb, greatly increasing the usual angle of the supporting cord, and elevating the foot of the bed and tying his shoulders to the head, at the end of four weeks more, three of the four inches had been pulled out, and he recovered with one inch shortening.

When careful daily measurement shows the limb to be as long as its fellow, the pull may be moderated, although the patient never complains of the pull. The patient frequently complains mildly during the first week or two of the heel or some other part of his limb resting too heavily on the hammock; this can be instantly relieved by loosening the canvas under that part, or tightening the part of the canvas on either side of it by means of the safety pins along the outer bar of the iron frame; or, again, he may say his limb below the knee is sagging too low or is lifted too high; this is remedied in a moment by shifting one or two of the small tent-blocks. He *never* complains of the pull. Usually it is the mere tedium that annoys him, and the slightest change of any kind will relieve him; most frequently merely raising or lowering the whole by means of the large tent-block will satisfy him.

Rotation can be absolutely prevented by overcorrecting the eversion in the manner I have described, of slightly raising the outer bar of the splint and rolling the limb over and propping it there with one or two rolls of cotton.

The chief point I wish to insist upon is, that *muscular resistance in these cases should be overcome gradually*, and that it is a wrong principle to endeavor to reduce "or set" a fracture of the thigh under ether or chloroform, or expect it

to stay reduced if such reduction should be accomplished. This can very rarely be done and still more rarely can it be made to stay reduced. Such efforts are hard for the surgeon and assistants, painful to the patients, and harmful from the possible trauma, and are not necessary, because with this splint reduction can be accomplished perfectly in two weeks with no trouble at all. The method of Bardenheuer (longitudinal and lateral traction) is complicated and requires the constant and careful attention of the surgeons and the best hospital care; and the same may be said of the extension abduction plaster spica of Royal Whitman. Even admitting that their results are good, such treatment and after-care are out of the reach of at least four patients out of five; while this splint can be used anywhere by almost anyone at little cost of time, money, or work; it is used without an anesthetic unless for diagnostic purposes, gives the greatest comfort (to all concerned), the quickest recovery, and by far the best results. A dose of morphine is, practically, never needed.

In fracture of the hip in old people, I and my professional friends in this vicinity, have had most gratifying results. In nine cases of my own and about as many more in the practice of others that I have been consulted about, none has died, and the majority have resulted in good union, little shortening, if any, and no stiffness of the hip or knee, and no bedsores.

This practice has been scattered over a number of years, and I have been able to get skiagraphs of only two of them. Some of the earlier cases were put up in the Hodgen only with the object of making them comfortable and with no hope of getting union, and little or no extension was applied. Two of these resulted in no shortening, and union resulted in all but two.

Uniformly good and excellent results have been obtained in my own practice in something over thirty cases of simple and multiple fracture of the femur, but most of them were treated before we had the *x*-rays, and most were in private

houses where an initial skiagraph could not be taken. Later, in this paper, I will report briefly those cases in which a skiagraph was obtained. For more than twenty years we have habitually treated many other conditions than fracture of the thigh with this splint. Nearly all conditions of the limb, in fact, where rest, elevation, relaxation, and the comfort of the patient might contribute to the recovery, viz., all compound fractures and dislocations, fracture of the patella, infections of the bone (soft parts or joints), resections of the hip (six cases), hip disease, and phlebitis. In such cases the limb is virtually removed from the body, so far as any movement of the body causing pain in the limb is concerned. When a painful limb is swung up in this way it swings about and accommodates itself to every body-movement, because the limb swings as a whole between the ligaments of the hip-joint and the suspension-cord, and these are both non-resistant. All the patients with resection of the hip recovered; and it would be difficult to convey in writing any adequate idea of the assistance given by the splint in dressing these cases, in changing the bed linen and caring for them generally. In these and other compound cases the hammock can be unpinned above or below or in the middle at the knee, according to the situation of the wound, and while it is being dressed the remaining sections of the hammock support the limb more steadily and tirelessly than any two or three live assistants could possibly do it. The case of hip-joint disease (which I shall make the subject of another report) was of four months' standing. The fever, pain, and soreness, and the starting pains had put her in the bed, and three successive attempts to relieve her with plaster dressings had resulted only in her growing steadily worse. After one week in this splint she played all over the bed and did not object to having her hip examined; and starting pains, which had kept her from sleeping for weeks, had all ceased. At the end of three weeks the fever, pains, and soreness were all gone, when she left my care and went to a distant

state to live. I have suspected from this one experience that separation of the inflamed surfaces is the most important thing, and not fixation, in the treatment of this disorder. The pull of the Hodgen separates the surfaces completely and constantly, but by no means fixes the joint, and yet this child got better from the day it was put on and continued to improve in the most remarkable degree the whole time she was in my care. This child on her back, in a well-ventilated room, got a great deal more exercise than she did sitting outdoors, watching the other children play while she herself was suffering greatly in the plaster.[1]

Case I (Fig. 10).—J. H., aged thirty years, in a railroad accident, eleven years ago, sustained a simple fracture of the upper and middle third of the right thigh, and a crushing injury of the left thigh, necessitating amputation in the upper third. He suffered a good deal from sepsis and sloughing, and the stump had to be dressed frequently for several weeks. This, together with the fact that his left limb had been cut off and we had nothing to compare the measurements with, and that shortening could affect only his stature any way, made us somewhat careless about possible shortening. According to the skiagraph there was overlapping, and of course there was shortening, though it is probable that most of it occurred after he got about. In one particular this splint may sometimes be the indirect cause of shortening. Patients lying with a limb in this splint get a great deal of exercise, so that at the end of eight weeks, when the condition of the thigh permits them to get up, the muscles of the arms, body, and sound limb are always in fine condition, with not even any stiffness of the knee or hip, and they may get to putting weight on the limb too soon, and the callus yields. This man was on crutches by the twelfth week, and as he had only one limb, and that the broken one, it had constantly to support his whole weight, whereas ordi-

[1] Another exactly similar case in every particular has fallen under my notice since writing the above.

narily the crippled limb would be protected by the other one for weeks after getting about. When this patient left the hospital, in the ninth week, the atrophy of the thigh muscles was so pronounced that I feel sure such a degree of overlapping as the picture shows would have been detected by the examining touch had it been present; but it was not, so I think the most of the shortening was caused by walking too soon and too much. The patient himself is positive this was the case.

Case II (Fig. 11).—Paul D., aged eight years. In April, 1907, he fell from a tree, and, landing on both feet, fractured both thighs in the middle thirds. His limbs were put up in two Hodgen splints at his home, a short distance out of town. The pulley-wheels were screwed into the board ceiling about twenty-two inches apart, to make the limbs swing in slight abduction. The suspension-cord was about eight feet long above the bed. Owing to the slight weight of the limbs there was, as is usual, a good deal of muscular spasm for the first week. To correct this and to give weight to the limb so that the traction would be greater, two long, loosely filled sand-bags, weighing three pounds, were placed on the front aspect of the thighs and held there with a few turns of a roller bandage. The foot of the bed was elevated about eight inches. When the cord was perpendicular the scales showed a weight of fourteen pounds with the sand-bags. When the bed was moved so that the pull on the scales was nineteen pounds, or an increase of five pounds net, the rope was at an angle of about 25 degrees.

Having to leave the city at the end of two weeks after this, I visited this boy every other day during this time, and instructed the doctor constantly in the management of the splint and gave instructions to the mother, who was also nurse, as to managing with the bed-pan and changing the bed, etc. As the callus was being formed and the limb was straight, before I left I put on well-padded, heavy plaster casts as an added safeguard, and, in lieu of the sand-bags,

to add weight to the limb. Hand-holds were placed at the head of the bed, and the patient was instructed to keep himself pulled-up in the bed. This, however, is always a superfluous command, as they always do so in seeking their own comfort.

I next saw this boy three months later, and his mother informed me that the doctor did not touch either splint until four weeks after my departure, when he took both of them off, and that two weeks later the patient was walking about as well as ever. The skiagraph shows the anteroposterior view. A fluoroscope side view showed as little deformity, but unfortunately we did not think it necessary to take pictures of them. The limbs are the same length.

Case III (Fig. 12).—Is that of the thigh of a young man, now eighteen years old, whom I treated for fracture of the thigh when he was nine. At the time his limb was so light I extra-weighted it by slinging a coupling-pin to the under side of the hammock. He was very unruly and flounced about over the bed at all times; but the suspended limb accommodated itself to his every movement, and he was entirely powerless to get it out of fix. I hunted him up two months ago (November, 1907) and had an anterior skiagraph taken. It showed no defect whatever in the line of the bone, and we were so sure we had taken the wrong limb that we sent for him again to come in from the country, when we got this side view, by which one is barely able to locate the seat of the fracture. A picture of the other thigh showed a normal bone. There is absolutely no shortening.

Case IV (Fig. 13).—J. W., aged thirty-five years, was treated in my hospital April 4, 1901, for simple fracture of the right femur at the junction of the middle and upper thirds, and was discharged May 21, 1901. During the seven weeks he was under my care I am sure he did not require my attention more than ten minutes a day on the average, including the fifteen or twenty minutes it took to fix it up at first and the same time spent in giving him an entire change of dress-

ing so that his limb could be bathed and a clean hammock applied. During these seven weeks he required very much less attention from the nurses than a patient with a sprained ankle would. He sat up in bed the greater part of each day after the first week. He read and wrote, bathed himself, and used the bed-pan without assistance, and as the weather was warm he frequently got over on another bed, rolled alongside, while his bed was turned and freshened up. He had no discomfort of any kind after the first week of his confinement. Measurements, gait, and skiagraph, taken seven years after the injury, all show a perfect result. This patient is the only one I have had who says his limb is longer than it was before. Theoretically this is possible, as muscular resistance is the only cause for shortening, in that it prevents the overlapping being pulled out. If the muscles should be so stretched that the overlapping would be over-corrected and underlapping exist, the bone would actually be longer.

Case V (Fig. 14).—W. H., aged sixty-five years, treated by Dr. McAdory, in 1903, for fracture through the great trochanter, which was demonstrated under chloroform and loaned to me in November, 1907, for *x*-ray purposes. The doctor gives me the history that there was eversion and two inches shortening; that he was treated for eight weeks with my Hodgen splint, and remained in perfect health and comfort during the whole time, which the last patient corroborated. He was walking about again in twelve weeks, and had never had any stiffness of the knee or hip and no bed-sores. No shortening is to be detected at this time.

Case VI (Fig. 15).—J. L., aged thirty years, was thrown from a horse and had his left hip broken, in September, 1906. I saw him in consultation with Dr. C., two miles in the country. Ether was given and the diagnosis made of fracture through the great trochanter. The limb was three inches short and in complete eversion. Three hours later we swung his limb up in the Hodgen without ether and without hurting him. I visited him every day for a week,

adjusting a pin here and a block there, until he was entirely comfortable and understood how to keep himself so. This, he informed me, was by keeping himself pulled-up in the bed and so to place his body that the rope would pull his leg slightly away from the other limb, which, happily, was also the best possible formula for the welfare of the limb. After the first ten days I did not go back to see him for three weeks, supposing Dr. C. was attending him. I found that no one had touched it since I had been there. All this time he had moved about in bed as he pleased and had been entirely comfortable. I found the splint in good condition and still doing its work perfectly and automatically, as was to be seen in the absence of eversion and shortening. There was such a great falling away of the muscles and fat in the region of the trochanter that I could satisfy myself fully that the fragments were in good position, and could feel that there was a very small amount of callus, which is another evidence that the fragments are well approximated. I lowered his limb to the pillow and took everything off; and while I pinned on a clean hammock cloth his wife bathed and rubbed his limb. The adhesive strips had not been made double and had stretched somewhat, but otherwise the changing was not necessary, except for the freshening up it gave him. This was the only time the splint was changed in the eight weeks, and this took about fifteen minutes without an assistant, the union being firm enough for me to hold the foot up with one hand and slip the splint under with the other; the rest of the procedure being merely to tie the traction strips through the distal loops to fix the limb in the splint, looping the four cords over the hook of the scales, elevating the whole by means of the large tent-block, and rolling the bed to its proper position and elevating the foot again on its blocks or bricks. This case well illustrates (what I have seen too often to recall all of them now) that if this apparatus is put up substantially in the first place, and the foot of the bed sufficiently elevated to prevent the patient

slipping to the foot in spite of himself, above all, if he is looked after attentively the first few days until the muscular spasm is controlled, and he is shown that the best thing for his limb is that which makes him most comfortable, this splint comes very near to being indefinitely automatic in its action. The skiagraph shows such a perfect result that one might doubt there had been a fracture, if the line of union could not be plainly seen running from the surgical neck through the great trochanter to below the lesser. This man had no stiffness of the hip or knee, and was walking well by the sixteenth week without a cane and without a limp. He has no shortening whatever, and when I saw him six months later I could not tell which limb had been injured, or that he had ever had an injury at all.

Case VII.—Is the final skiagraph of a man, aged thirty years, who had a bad simple comminution of the thigh.

Case VIII.—Are before and after skiagraphs of the same. Are so nearly alike in their history, course, and results, I shall report them together. Case VII was treated by Dr. Torrence, and Case VIII by Dr. Whelan and myself. These cases should not be reported as having been treated with the Hodgen splint, and I report them only as examples of "how *not* to do it." They were treated according to my recommendations in every particular, except that the hospital management would not allow a pulley-wheel to be put in the ceiling and would furnish no suspension-frame, except a very unsteady one that allowed of a suspension-cord only two feet long. I had heard repeatedly that the results at this hospital were not entirely satisfactory as to shortening, even while it was common practice to have the spring-scales showing a greater pull than I was in the habit of using. Being permitted to visit Case VIII frequently and practically take charge of his treatment, I satisfied myself perfectly that an adequate pull cannot be applied with a cord only two feet long. The greatest pull I could effect was twenty-five pounds. This was pulling almost

horizontally, was very irksome, restricted the patient's body movements to nothing, and invariably pulled his foot down against the foot of the bed, and still did not reduce the shortening. These conditions more nearly represent the stiff, uncompromising pull of Buck's than the free and comfortable swing of the Hodgen. These patients have fairly good results. Case VII is said to have no shortening, but the skiagraph undoubtedly shows that he has some, while I know that Case VIII has nearly an inch. Had these two cases been treated in their homes, with a long suspension-cord, so that the patient's body movements would actually increase the efficiency of the eight or ten pounds' pull, giving that rocking, teasing motion, I feel sure the results would have been much better. In fractures badly comminuted, like these, a heavy plaster dressing should be applied from the knee up to the perineum to aid the natural splinting action of the tense muscles in forcing the fragments back in place. I mention these last two cases only to show the importance of the long suspension-cord, and that the more this cord is shortened the nearer the principle of extension approaches the principle of Buck's extension, which, it has been one of the main objects of this paper to explain, is not the proper principle.

R. D., aged fourteen years, hurt in a football game in November, 1905. He was treated for a sprain of the knee until two months later, when the *x*-ray revealed a backward and outward fracture dislocation of the knee. In June, 1905, I operated for the reduction of the deformity, which was causing him to walk with a very bad flexion-valum limp. The condyles or lower fragment had become firmly united to the posterior edge of the fracture surface of the shaft, and to a mass of new bone that had formed under the stripped-up periosteum of the under side of the shaft. This union was chiselled through, and then, by sacrificing a thin plate of bone from either fragment, the reduction was effected and the fragments sutured with one heavy silver wire

eight weeks afterward. The operation was done without opening the joint, the wound was closed with silkworm gut and a small drain of the same, and the limb put up in the Hodgen splint without extension. There was some infection and suppuration, and the wound had to be dressed daily for a week or two. By having the knee portion of the hammock a separate piece, this was unpinned and turned back, making the dressing a very easy matter for one person with no assistance, except that given by the thigh and leg portions which supported the limb while the dressing was done. This patient suffered little or none and was out in eight weeks with a perfectly straight limb and one inch shortening, due to loss of bone and growth in the epiphysis.

One case of compound fracture of the femur, with severe infection and sloughing, in which from first to last more than twenty incisions were made in the thigh and gluteal region, the whole septic period lasting four weeks, was finally saved with one inch shortening, due to loss of a fragment of bone. In this case, large wet dressings were applied every four or six hours, frequently by the night nurse alone. In doing this the limb was elevated by means of the large tent-block and pulley, while a large douche pan was slipped under the buttocks. With the thigh half of the hammock unpinned and turned down, the upper portion of the splint would tilt up out of the way and the leg portion of the hammock supported the whole limb while the dressing was applied.

One case was that of a man who sustained compound comminuted fractures of both condyles, both so extensively shattered they could not be wired, patellar tendons cut across and both knee-joints torn widely open and ground full of mud. By having the hammock in three pieces and turning back the knee portion, the wet dressings could be so easily and frequently applied that this patient never had any septic absorption and recovered, in part, with one stiff limb and with some motion in the other. The latter limb was inad-

visedly amputated nearly a year later, however, on account of continued suppuration of the shattered condyles.

Lastly, I have two old lady patients, eighty years of age, whom I treated six and ten years ago, respectively, for fractures of the hip. Neither of them had any stiffness of the knee or hip; and both have been walking about ever since with no apparent shortening. Both are too feeble now to leave home to have their skiagraphs taken.

A few other cases I might have presented from the practice of my surgical friends, and said to be good results, were open to the objection I have dwelt on above, *i. e.*, a very important principle had been neglected or ignored; and I did not consider such cases as fair examples of the method.

After using this splint for more than twenty years in its gradual modifications, and giving it a good deal of thought in that time, I am now inclined to believe and make this seemingly radical statement, that there is no simple fracture of the thigh that cannot be successfully treated with it, and that it is never necessary to do an open operation in a recent case.

If the details of the method I have described are carried out, the results should be perfect in nearly if not all cases, and the amount of attention required from surgeons and attendants will not be one-quarter that of other methods. If it is put up in a slovenly manner, it will not be substantial, the work will be annoying, and the results may be anything.

The greatest difficulty is that accurate attention to the details is not given. While these are not at all difficult nor complicated, they do not *seem* to be of much importance, and are often slighted by the beginner, when they are really vital to the success of the whole. If a tent-block slips or splits, the cords of traction-strips stretch, the pulley pulls out of the ceiling, or the bricks supporting the foot of the bed tumble over, the operator with any mechanical bent at all will be able to locate the defect and remedy it, without getting discouraged to the extent of abandoning the experiment altogether.

One of the leading surgeons of the country began an article on fracture, a year or so ago, by saying (in effect) that after a very large experience in accident surgery he still approached the treatment of fracture of the thigh with much misgiving. In contrast to that, I have to say there is no fracture in the treatment of which I am so confident of getting a good result. By a good result I mean: the patient made comfortable, a minimum amount of work for the surgeon and attendants, no bedsores, the patient retaining a good muscular condition by reason of the great amount of liberty of movement and exercise he gets while under treatment, never any stiffness of the knee-, hip-, nor ankle-joints, the quickest union and shortest convalescence, a straight limb, with no shortening and with never a non-union.

I am perfectly willing to be thought radical, even absurd by some, if I can induce a competent and influential surgeon here and there carefully to investigate the matter. The subject is certainly of importance, when it is admitted on all sides that, so far, the treatment of this fracture has not been satisfactory even in the best hands in the best hospitals; and interest should certainly not be taken from it, when I assert that it is being treated most successfully all over this part of our state; in log cabins by country friends of mine, and in the large contract work of the mines in this district, as well as by all except one or two of the doctors in our city. I I think anyone can use it who has mechanical eye enough to see how the weight of the limb is used to make the extension. The rest lies in understanding the importance of putting together properly and substantially what, at first sight, seems a sort of childish plaything, and retaining one's patience until one masters the slight art to adjust the safety-pins, cords, and tent-blocks, the angle of the suspension-rope, and the position of the bed, until the patient is comfortable and the limb is being pulled sufficiently and in the proper line.

PRACTICAL POINTS IN THE TREATMENT OF FRACTURES OF THE FEMUR.

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At the present day when skiagraphy shows and often exaggerates every slight bone defect, and when nearly every injured person sues for damages, it is more than ever before important that we get perfect results in treating fractures. I have been surprised recently to hear several excellent surgeons express the opinion that this could not be done in fractures of the femur, and in certain other fractures, without wiring, or in some way fastening the fragments through open incision. In simple fracture of the femur, I am convinced from a rather extensive personal experience that results may be obtained, without open operation, that are both functionally and anatomically perfect; and that even in the best hands open operation is not entirely free from danger, and is followed in a considerable number of cases by suppuration or infection which, while not usually dangerous to life, causes much annoyance and delay and frequently necessitates a second operation with resection and unavoidable shortening. In compound fractures we have already an open wound, usually contaminated, the chance of suppuration is lessened by open operation with thorough cleansing of the wound; and, as a general rule, compound fractures should be so treated. But in simple fractures it seems unjustifiable to subject the patient to the dangers of anesthesia and infection even though slight, f perfect results can be obtained without. This is particularly

true in old patients whose arteries and kidneys are not sound, or when for any reason the giving of an anesthetic would be a serious risk. In fractures of the femur, not compound, except in those just below the lesser trochanter and in the lower fourth of the bone, perfect results can be obtained, in nearly all cases, if the following points are carefully observed. Enough weight for extension must be applied to overcome the shortening *completely*, and *this must be done within twenty-four hours of the injury*, or it can never be done. I consider this a *very* important point. A few hours after fracture the limb can be easily drawn out to its full length, except during muscular spasm. A heavy weight, applied properly and early, soon overcomes the painful spasm, gives the patient great relief, and insures a full-length limb. The weight must, of course, be suited to the size and strength of the muscles to be stretched, and will vary from ten to thirty pounds. I have never had to use over twenty-five pounds; but this weight *must be applied in an effective manner.*

I have been told by excellent surgeons that ninety pounds had failed in some cases to overcome all shortening, and I can readily believe this, if the weight was not applied for several days or if, as so often happens, it was applied in such manner as not to exert its force on the right part and in the right direction. No man could long stand ninety pounds properly applied. During the past two years I have observed a large number of cases under the treatment for fractured femurs, in hospitals at Washington and several other cities. These cases were nearly all treated by some form of extension with weight and pulley. But with the exception of a few children with vertically suspended limbs, I saw no single case where the weight was really doing what it was supposed to do. Either the board used to spread the adhesive strips away from the ankle was against the foot of the bed, and all the force of the weight exerting itself against the bed rail, or this board was caught in a fold of the bedclothes or mattress, or the heel was similarly caught, or a pad or pillow or sandbag was

jammed between the heel and the foot of the bed, or the weight was resting in part or wholly upon some projection from the bed or even on the floor.

It is safe to say that few, if any, patients could stand the traction of ninety pounds for more than a few minutes, and even twenty-five pounds will pull the ordinary man down against the foot of the bed in a few minutes unless some effective means be used to prevent it. Simple elevation of the foot of the bed with blocks or bricks is not effective unless the patient is pulled up every fifteen or twenty minutes, and this frequent pulling of the patient up in bed is painful during the first day or two, increases muscular spasm and lessens the chance of getting complete relaxation. I have found elevation of the lower half of the mattress to an angle of 20 to 40 degress much more effective. The patient's sacrum then impinges upon the mattress in such a way as to prevent slipping down, and a satisfactory form of counterextension is established. A simple way of elevating the lower half of the mattress is by putting boards under it, letting them rest on the footboard or footrail of the bed and project far enough over the foot of the bed to accommodate the pulley in a suitable position, as shown in the accompanying diagram. (Plate I, Fig. 1.)

Attention to minute details is as important in treating fractures as in aseptic surgery. The surgeon who expects to get perfect results must attend to these details personally and carefully, at least until assistants and nurses are better trained in these matters than they are at present. This very close attention is necessary only for the first few days, but we must see that the weight really exerts its full force, and that it exerts it in the proper direction, that it is sufficient to entirely overcome shortening, and that there is efficient counter-extention of some form to prevent the patient slipping down in bed. We must see that the pulley wheel is not rusted so that it cannot revolve, that the rope is not jammed in the pulley, that the weight swings free, and that especially the

traction is not in such a direction as to pull the patient's heel down against the mattress. It should tend to lift the heel and to relieve pressure thereupon. In old persons especially, it is well to put a thin pad or cushion under the leg to prevent pressure on the heel, which in many cases is very disagreeable and may cause ulceration. A soft pad under the knee may be needed to prevent sagging. A condition of recurvatum may follow sagging of the knee.

In children vertical suspension of the limb gives most comfort, both to the patient and nurse, and also gives the best results. (Plate I, Fig. 2.) The counterextension in the weight of the body is perfect, there can be no slipping down in bed, and it is surprising how cheerful children are under this treatment and what freedom of movement of the body and arms they have, especially when the well leg is tied up alongside the broken one. Enough weight should be used to nearly lift the sacrum from the bed, thus preventing pressure and possible bedsores. We have treated children up to ten years of age with vertical extension, and I see no reason why it should not be applied to adults in selected cases.

By care in the application of the foregoing principles, shortening may be certainly avoided. The only other difficulties to be overcome are rotation, angular deformity, and lateral displacement. Undue rotation may easily be prevented by sandbags placed on each side of the foot, but they must be heavy enough to stay in place, and thick enough to impinge well up on the sides of the foot near the toes. Angular deformity gives no trouble unless combined with lateral displacement. Except in fractures just below the lesser trochanter and in the lower fourth of the bone, both these conditions are usually overcome by the traction if it is properly applied. This is because the fragments, even when there are several of them, are usually attached to the periosteum and to the tough fibrous tissue surrounding the bone along Hunter's canal, and, particularly, along the linea aspera, and when the fibrous tissues are stretched straight the fragments

PLATE I

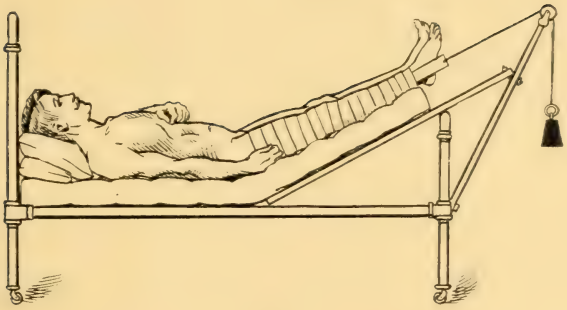


FIG. 1

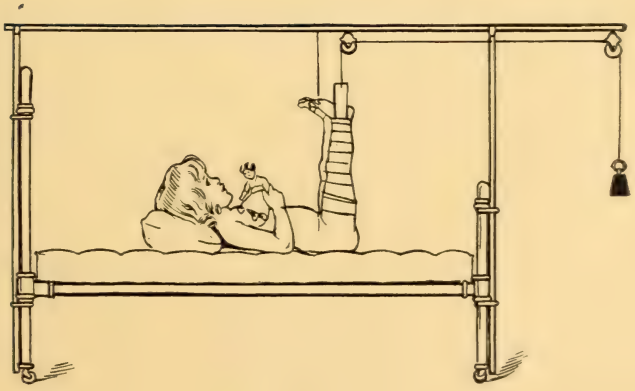


FIG. 2

come into line like a string of beads when the cord upon which they are threaded is stretched. It is seldom that soft tissues are caught between the fragments in fractures of the femur. Occasionally in very oblique fractures the sharp point of the upper fragment becomes imbedded in the muscles of the back of the thigh, but when the shortening is entirely overcome the point draws out and resumes its proper place.

In fractures just below the lesser trochanter the upper fragment is tilted upward by the psoas and iliacus muscles, and slightly outward by the abductors and external rotators. It is impossible to keep the upper fragment down, for the constant pressure required would soon cause necrosis and perforation of the bone even through the skin. But if the lower fragment be raised to the proper angle, as in Plate I, Fig. 1, and the thigh and leg slightly abducted, this difficulty is usually overcome. It may be necessary to increase the flexion of the thigh to an angle of 45 degrees.

In fractures of the lower fourth, extension with the weight and pulley is practically useless, because the gastrocnemius tilts the lower fragment downward so greatly that the knee must be flexed to relax this muscle. This leaves too short a hold for adhesive straps over the lower fragment, the leg being flexed out of the line of traction.

But these fractures are usually transverse or slightly oblique, frequently with jagged or notched edges, and if reduced, with the knee flexed and placed upon a double incline plane, will remain in good position without difficulty.

In this region, however, it is difficult to detect malposition in a short fragment, and unless the surgeon can satisfy himself, by a skiagraph or other means, that the bones are in proper position, an open operation should be done, provided the patient's general condition warrants it.

In fractures of one or both condyles, owing to the very tough ligaments surrounding them, there is usually little displacement of the fragments, and this slight displacement may be detected by careful palpation, reduced by flexing

and extending the knee, and treated by simple plaster cast. In all fractures it is desirable to have two good skiagraphs taken: one anteroposterior and one lateral view, and this should be done whenever possible.

After the first week the weight may be gradually lessened—measurements of the limb being taken frequently to see that no shortening is beginning. After three weeks the extension may be removed and a plaster cast applied.

We must remember that correction by open operation can be done just as well a week after injury as at an earlier period, and it is perhaps an advantage to wait that length of time, as the tissues are then prepared for rapid healing and in better condition to resist infection than immediately after injury.

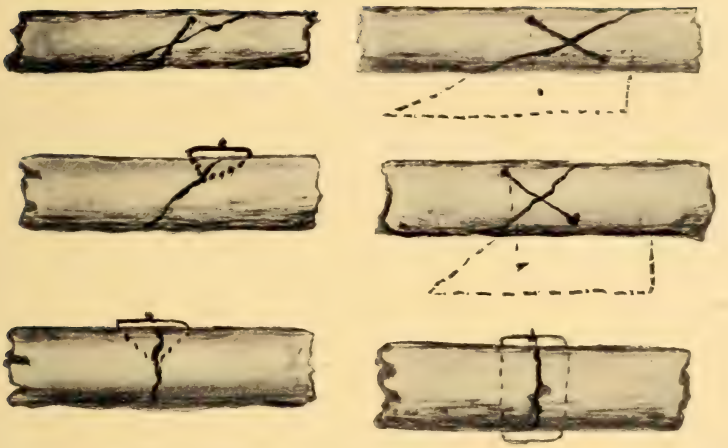
In all cases of fractured femur in which the fragments cannot be kept in perfect or practically perfect apposition, I am heartily in favor of wiring, the patient's general condition permiting; but in simple fractures I think the attempt should should first be made to keep them in place by means above mentioned, and if these measures are carefully carried out few cases will require the operation.

For fastening broken bones I prefer wiring with iron wire, except in such places as the neck of the femur, where wiring would be very difficult and a nail is preferable, or the insertion of a drill to be afterward removed, as frequently practised by Dr. Shands. My only objection to the use of the drill in this way is that it leaves a little sinus, sometimes slow in healing.

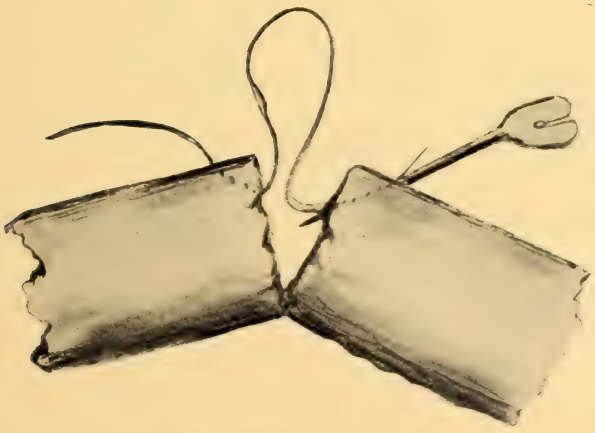
Objection has been made that wiring does not hold the fragments securely, and that it causes a rarefying osteitis or necrosis of the bone. Neither of these things should give trouble if the wiring is properly done.

By using galvanized soft iron wire, which is very much stronger than silver, and by applying simple rules of mechanics in placing the wire, a single small loop passed only through the compact bone on one side may be made to hold

PLATE II



The right way. The wrong way.



Use of small director in passing wire.

PLATE III

FIG. 1.—Clamp.

FIG. 2.—Saw.

FIG. 3.—Saw in use. *A*, saw; *B*, clamp.

FIG. 4

FIG. 5

(These instruments may be obtained from Lenz & Losseau, 623 Seventh Street N. W., Washington, D. C.)

any two fragments so that there can be no lateral displacement nor rotation. Angular displacement must be prevented by traction, casts, or splints, no matter what method of fastening be used.

There is little or no danger of necrosis, caries, or rarifying ostitis if the wire does not pierce the medullary canal and whole thickness of the bone. Some proper and improper methods of wiring are shown in Plate II.

In conclusion I wish to present some instruments of my own make that I have found very useful in resecting and wiring bones.

The first (Plate III, Figs. 1, 2, and 3) is a modification of Wyeth's bone saw. It is much simpler and stronger, and gets a firmer hold on the bone than Wyeth's saw.

The second (Plate III, Fig. 4) is a small drill, of which I am rather proud. It is used like a little brace and bit in one hand, leaving the other hand free to hold the bone or for other use. I find that if the shank of this little drill is just the right length and just the right curve it can be used very rapidly and effectively; but a very slight change in either curve or length makes it awkward. The drill point is inserted in a very simple manner.

My third instrument is simply a very small, very thin-grooved director. Small enough to pass readily through the drill hole and guide the wire. It saves much time and annoyance, particularly in passing a wire from within outward through the second fragment. (Plate III, Fig. 5, and Plate II, lower figure.)

DISCUSSION ON PAPERS OF DRS. MASON, ROBINS, BROWN, AND CARR.

Dr. Hubert A. Royster, of Raleigh, N. C.—There can be no more timely paper than the first one of the series, which has been presented by Dr. Mason. I have had some personal experience with fracture dislocation at the shoulder-joint, having had four cases within seven months in 1905. These cases were reported in detail at the meeting of the American Medical Association in June of this year, and my study of them proved to me that the profession knew very little about the condition; they had not recognized the frequency of its occurrence, and no text-book on surgery in the English language contains an adequate description of the proper methods of treatment. The condition is one which, I am sure, occurs more frequently than is usually supposed. There are patients going about the country with injuries of the shoulder-joints that have never been properly replaced. There are other cases which are now submitted to *x*-ray examination, and still other cases which have gone to the surgeon afterward for resection of the joint. If we had, first, a proper and prompt recognition of these injuries, and surgical relief was instituted in the proper way and at the proper time, and if the profession would interest themselves in these conditions, we would have better results to show.

The paper of Dr. Mason contains the gist of the matter, and I shall not attempt to either discuss it very fully or to rehash my own ideas on the subject. Suffice it to say the proper surgical handling of these cases consists (1) in immediate recognition and prompt incision as soon as they occur; (2) putting them up either by wire or in some position which will hold the fragments in apposition after the dislocation has been reduced; (3) the proper immobilization of the parts. How can we diagnose these cases early? The *x*-rays have been mentioned as the best possible way to do so, and I agree to that. I want to say something, however, regarding the failures of the *x*-rays in this respect, and that is, that the important thing is the proper method of interpreting *x*-ray findings, and not so much the beautiful picture. We had one case, particularly, in which the outline of a piece of fragment of a comminuted fracture of the upper

extremity of the humerus gave the impression of a fracture through the neck of the scapula, and it was so pronounced by several who examined it. A great many German observers have pointed out that the *x*-rays have failed to show the true condition in these cases as they ought to do, especially in old injuries. Two cases have been reported by an operator in Boston, of a double dislocation and fracture of both humeri, with swelling over the joint, in which the *x*-rays failed to show them by repeated examinations, but on cutting down the condition was found as described.

Just a personal word or two as to my four cases, their order of occurrence and the results, will show the necessity of early recognition and proper understanding of the cases.

The first one was brought to me after the union of a fracture, and in attempting to reduce the dislocation I refractured the bone, a thing which happened twice in the hands of Morton.

The second case was overlooked. It was a healed fracture of the anatomical neck which prevented reduction, and was easily cleared up on incision.

The third was a comminuted fracture of the whole upper extremity of the humerus, about eight weeks old, and the fourth was a case which I saw three hours after the injury, and without attempting any reduction, opened the joint, replaced the bone, and secured an ideal result. Of the other cases, the first was a failure, in the second I got a nearly perfect result, and in the third only a fair result.

I must confess that I knew nothing about the condition when I first encountered it, and my teaching was not of the kind which impressed me with the importance of it. If surgeons would report these cases they will find that there are many more of them than they have heretofore thought, and the list will keep on growing. Reduction should not be attempted if by it any damage may be done. I liken it to taxis in strangulated hernia. If we find we are likely to injure the joint we should not make any attempt at reduction, but cut down at once under an anesthetic.

Dr. John F. Oechsner, of New Orleans.—This symposium allows of a great deal of latitude in discussion, and I rise to speak in favor of plaster of Paris. Dr. Carr's paper, of a more general nature, permits one to speak of the use of that material. The papers of Drs. Robins and Brown were in reference to particular splints.

I would like to speak of the advantages of plaster of Paris in the treatment of fractures of the femora of children. We know that in fractures of the femora of children union will take place under almost any conditions. In fact I have a case of compound fracture of the femur illustrating the fact that even though the bones are bathed in pus it will not prevent union. Such a case was treated by means of the long plaster spica fenestra, cut into the plaster to allow the wound to be drained through and through with drainage tubes. At the end of four weeks I removed the cast and found union complete.

The disadvantage of splints that exert horizontal or perpendicular traction is that the patient is confined to bed in the treatment of these conditions, and the idea is to get the patient out of bed as soon as we possibly can. The principles of treatment of all fractures are: (1) reduction, and (2) the maintenance of reduction. How do we accomplish this? In a series of fifteen cases of fracture of the femur in children I have had perfect results in all of them, and all of them were treated by means of the long plaster spica. I anesthetize the child thoroughly, and notwithstanding that gradual traction probably produces more permanent relaxation of the muscles, yet by complete anesthesia we secure an immediate thorough relaxation, so that reposition can be practised very readily. These cases show that prompt reduction, and the maintenance of reduction, are accomplished by means of the plaster spica extending from the toes away beyond the hips. Children in that condition can be taken out, and, if old enough, allowed to walk on crutches in a few days; and it gives them an abundance of fresh air. So secure and so excellent have been our results with children, that this method has been adopted by other surgeons at the Charity Hospital in the treatment of adult fractures of the femur. The patient is put on horizontal extension for a period of from five to ten days, until muscular relaxation is complete. A long plaster spica is used, and the patient permitted to get up. As I have said the results have been excellent, so I rise to speak heartily in favor of plaster of Paris against any other method of fixation.

Of course we have no one routine method, but if there be any method that produces ideal results in my experience, it is that by means of plaster of Paris.

Fractures in children unite with great rapidity. Frequently we encounter fractures of the clavicle in children which pass unnoticed, particularly the subperiosteal variety, where the periosteum remains intact. The case returns when a callus has been formed. Approximation of fragments can be retained better by plaster of Paris than by the accepted method of Sayre or the posterior figure-of-eight bandage, which later becomes loose and requires frequent changing.

Dr. R. M. Cunningham, of Ensley, Ala.—I have treated a great many fractures. If I were in a court swearing, I would swear that up to this time we have not an ideal method for treating all cases of fracture. In some of the cases we are going to have bad results, especially so far as shortening is concerned, in thigh fractures, no matter what method we may adopt. This, in my judgment, is more nearly the ideal method for all cases than any other that has been applied up to this time. Formerly I treated all cases of fractures of the thigh with plaster of Paris, in those at the lower third carrying the plaster of Paris up to the groin, and I had shortening in many instances. I then added to that Buck's extension, putting on adhesive strips, etc., and over them putting on plaster of Paris, and using from fifteen to eighteen pounds of weight. Then, for fractures of the upper third and of the neck I used the spica, and that failed. I have never yet treated a fracture at the upper third of the thigh without, at the same time, employing extension of some sort, and I do not get shortening. For several years past I have absolutely abandoned the plaster of Paris in thigh fractures except for fractures of the lower third of the thigh and in children.

My experience with the Hodgen splint covers little over a year. My friend, Dr. Brown, read a paper before the Medical Association of Alabama, which induced me to use it. The first case was one of double fracture. The left thigh was fractured four inches above the knee-joint; the right three or four inches below the hip-joint. On the left side there was not much traumatism of the soft parts. On the right side there was enormous traumatism; there was a hematoma of large size, so much so that at one time it looked as if we would have to operate to stop hemorrhage. This man had, on his left thigh, tuberculous disease when he was five years old; the left thigh was two inches shorter than the right. He was put up in a double Hodgen's splint. With both legs put up in

Hodgen's splint it is difficult to secure adequate extension. Traction is diminished and the patient is more liable to slip toward the foot of the bed. This was overcome by a little mechanical ingenuity. The muscles on the left side were atrophic. There was no angulation. The splints were removed at the end of the fifth week, and there was not, in my judgment, good union. The patient objected to any further application of splints. He remained in bed another week, and then went home with very little angulation on the right side. This subsequently occurred, so that the result on that side was not ideal.

Of the next two cases one was an Italian, aged thirty years, and the other a Pole, aged forty years, in which the results were perfect. A third case was in an American. In all three of these fractures the fracture occurred at the lower third, and the immediate results were perfect. The Pole, however, had six weeks' extension, remaining in bed a week longer, making seven in all, but after being discharged from the hospital he developed angulation at that point, so that the ultimate result in his case was not absolutely ideal.

In the case of a boy, aged fifteen years, there was a fracture at about the middle third of the thigh with enormous traumatism, contusion, and laceration of the soft parts on the outer side of the leg below the knee down to the bone. The deep parts were brought together with catgut, silk, and with silkworm gut. The skin sloughed. There was primary union of the soft parts. It was impossible to apply adhesive plaster over the wounded parts, and, consequently, we were unable to get the leg as long as the other. I was assisted in this case by a gentleman who had been trained by Dr. Brown. The Hodgen splint was removed, reduction effected, and the limb put up in plaster of Paris, according to the method advised by Dr. Westmoreland, and a good result was obtained without shortening.

In conclusion I wish to say that for any fracture above the middle third of the thigh, including the neck, the Hodgen splint is the best method, and when it is removed, as I am now practising and carried out in the cases where we had such perfect results, plaster of Paris is applied and worn for at least three weeks.

Dr. Randolph Winslow, of Baltimore.—I only wish to speak of three points in connection with these papers. In

the first place, I have been extremely interested in the paper of Dr. Mason in regard to fracture of the neck of the humerus with dislocation. I was not only interested on account of the valuable paper read by my friend, Dr. Royster, last June at Atlantic City, but on account of a case that has occurred in my practice since then. A gentleman of middle age, a heavy man, fell down a stairway on a steamboat on Lake Champlain, sustaining a serious injury. He was taken to a hospital, was placed under an anesthetic, and attempts were made to reduce the dislocation. It was ascertained, however, that reduction could not be brought about by traction. The man was subsequently brought to Baltimore and a dislocation with fracture high up was found. I recognized that it would be impossible to reduce this dislocation by manipulation, so after a few days' rest, to give a chance for the subsidence of the swelling that had taken place, I made an incision, found the head of the bone dislocated under the coracoid process, and a fracture through the tuberosity at the extreme upper end of the shaft of the humerus. With some difficulty, and by grasping with the lion-jaw forceps, the head of the bone was returned to the glenoid cavity and the reduction was completed. There was slight comminution of the tuberosities. It was not necessary to wire the bones because they could be held in position without so doing. I did suture the periosteum of the comminuted fragments, and the man did well so far as getting good union was concerned. But he had received a severe injury. I do not know what damage might have been done before he came into my hands. He was long in recovering the use of his arm, but eventually he will get a very good arm.

The point I wish to reiterate is that it is practically useless to attempt to reduce these fracture dislocations by manipulation, and it is much better to proceed at once to operative procedures than to temporize by manipulation.

The other points I wish to speak of are in regard to the matters mentioned by Dr. Carr. In the first place a fracture at the upper part of the femur, with rotation outward and upward, is much better treated by open incision and fastening the bones together either by screw, brad, nail, or wire in some way, and not to trust to splints. The same may be said in regard to a fracture at the lower end of the femur immediately above the condyles, where the lower fragment is turned

backward into the popliteal space, and the upper fragment of the femur penetrates the soft parts, and where, in my experience, it is impossible to get them together, we save time and damage to the tissues by proceeding at once to operative measures for the reduction and immobilization of these fragments.

Dr. George A. Hendon, of Louisville.—There is one principle underlying the approximation of fragments of broken bones that applies to the approximation of fractures everywhere, and more particularly to the upper third of the femur, and that principle is this: If we have two fragments of unequal length, one very long and one very short fragment, it is useless to exert our efforts upon the shorter fragment. We must always yield to the position of the shorter fragment and manipulate the longer one to gain allignment. In a fracture of the upper third of the femur we have a long shaft of bone below and a short shaft above. The proper method of approaching the solution of that problem is to consider the position of the upper fragment. It is flexed by the fascia lata and by the psoas and iliacus. It is rotated outward by the muscles attached to the digital fossa, and the natural and rational indication is to manipulate the lower fragment, or long one—one you can handle by means of leverage—to bring it into approximation. That end can be accomplished by flexing which follows the movement indicated by the upper fragment and placing the limb in a position of abduction. I should have said before going this far, that the lower fragment is adducted or pulled in by the adductor magnus and the adductor longus, but particularly by the adductor magnus muscle, so that in order to make it shake hands with the upper fragment, it becomes necessary to flex it and abduct the limb. Since adopting that principle I have never found any form of extension necessary in treating fractures in dislocation. I have applied sufficient plaster to maintain this position, not with the idea of making any extension at all, but to maintain the position of flexion, abduction, and to rely upon the natural tendency for outward rotation.

After an experience of ten years, which includes probably as many as twelve or fifteen fractures of this class, I have not had any cause to regret this method of management. And by this means we have eliminated the various kinds of apparatus. In dealing with the fractures immediately above the

condyles of the femur, the shortest way out of the difficulty is to divide the tendo Achillis and relax the calf muscles and take tension off the lower fragments, and dress the limb in flexion or extension as seems to suit the case.

Dr. W. M. Perkins, of New Orleans.—In regard to the Hodgen splint, I shall show at the clinic tomorrow a modification of Dr. Brown's improved Hodgen's splint, which obviates some of the objections to its use. The Hodgen splint has to be made for the particular patient, and much time is lost in doing this, and it is impossible to do it in all cases. I have a model which shows that the splint can be made so as to fit the right or left leg of a very small child or large adult. Only a slight change in it is needed for children. The splint can be made to suit any case on either side of any-sized patient.

Dr. Brown deserves credit for reviving the Hodgen splint. He has shown the usefulness and great practical value of it in his own work. This splint, as modified in accordance with the suggestions of Dr. Brown, is thoroughly useful and the best splint for a large number of fractures. It is particularly useful in aged people who have sustained fractures, and in whom we fear the effects of dorsal decubitus.

In children plaster of Paris forms an efficient means of extension and counterextension. It does not do so in the adult, where the larger muscles pull so forcibly that the skin over the malleoli and the tendons about the ankle cannot survive the pressure. The child, needing less pressure, sustains less injury and necrosis.

Dr. Robert Carothers, of Cincinnati.—I rise to thank the gentlemen for presenting these most excellent papers, and for giving us so many valuable points.

With reference to the admirable work of Dr. Brown in connection with the Hodgen splint, I would like to ask him if there would be any objection, after using it say for eight or ten days, to putting the limb in a plaster dressing, a long or short spica as the individual case would demand, and thus put the patient on his feet? It seems to me we are getting away from the use of plaster of Paris. Men who have not done a great deal of plaster-of-Paris work and have not developed a plaster technique, are apt to meet with disappointments with the use of plaster of Paris. But I believe if one will take the time and trouble to develop a decided plaster tech-

nique, he can do a great deal of good with plaster which is now being done with splints.

I have not used the Hodgen splint, although it has appealed to me strongly for some things. I would not, however, use it in a high fracture of the femur. I would not want to use it in a case of fracture of the neck of the thigh. So far as the anterior part of the capsule is concerned, these fractures are all intracapsular, and the capsule gets between the fragments and we have trouble, and no splint or plaster dressing will take that out except certain manipulations or cutting down on the case, relieving the capsule and wiring or nailing it. I do not think the Hodgen splint will met with great favor in that locality.

Dr. Mack Rogers, of Birmingham, Ala.—I want to add my testimony to the efficiency of this splint. I have used it ever since Dr. Brown brought it out and made its use clear to my mind. In almost all cases of fracture of the lower extremities this splint, when properly applied, is of great practical value. After trying the splint, to my great joy and delight, I found it could be used to advantage for many different injuries; for instance, take a man with a badly mashed foot, put it up in a Hodgen splint, elevate it so as to get the return circulation, and he will get so much comfort and relief from it that he will praise God, and you too, and make a more rapid recovery.

With reference to fractures of the thigh I have taken pains to read Dr. Brown's arguments and to study the principles he has tried to develop in connection with this splint, and it appeals to me forcibly as the rational thing. Why? Because of its adaptability and efficiency, it is one of the most valuable things I have ever seen. One can adjust it to suit almost any case. I think some of our hospitals make a mistake in having a jack-screw arrangement which at most is not more than five or six feet high, from which to suspend the splint. That is entirely too low. We want more suspension of the limb, say six or eight feet from a point in the ceiling, and when we get that we get adaptability of the splint.

Not long ago a girl, aged fourteen years, would not endure her limb being in this splint. I took the limb out of the splint, put it up in plaster, and, as a result, I had to refracture the limb. I told the parents very frankly that that was the result of the unruly conduct of the child. After refracturing

it I put it back into the splint and insisted on it staying there. There was no shortening or angulation. I mention this as an instance showing the extreme efficacy of the splint. I believe the more we study this splint the more it will appeal to us. It is a thing that requires careful attention in its application. You may not use it from the start very enthusiastically, but after you have employed it a few times you will have half a dozen of them on hand. I keep several on hand at a time, so that I can have one when I need it. When you use a Hodgen splint, you must not use a weight. But you will hardly ever use the splint if you wait about providing it and educating yourself as to its application until you actually need it, because it cannot be improvised or effectually applied without some previous knowledge of it.

Dr. Mason (closing the discussion on his part).—Just a few words in regard to my own paper. Dr. Royster's recital of four cases of fracture dislocation occurring within such a short time is particularly interesting, and he seems to have followed all the indications in the cases. His conclusions as to the advisability of prompt operation agree with my own, and his perfect result in the case upon which he had the opportunity of operating immediately justifies the position that we have taken in regard to prompt operation. Some of the members have said that perhaps no attempts should be made to reduce by manipulation, and I agree with them that but little time should be lost in these attempts; however, in addition to the case reported by me, my paper is a compilation of the cases which have occurred since 1894, and my deductions are largely from this compilation. As it is shown that some cases are reduced by manipulation, I have advised that this be carried on with gentleness before resorting to operation.

I wish to call attention to the valuable contribution to the literature of irreducible dislocations of the shoulder by my former preceptor, Dr. Edmond Souchon, who presented this subject to the American Surgical Association at its session in 1897.

With reference to the Hodgen splint I was delighted, on leaving the Charity Hospital of Louisiana, in 1899, to find an improvement on the method of treatment of fractures of the femur which was practised in the institution at that time. We used a Liston splint. This consisted of a long external splint running almost to the axilla, with a cross-

piece at the foot, and an arrangement for extension with adhesive straps at the foot piece and for counterextension by means of a perineal strap running around the groin. To apply this splint it took three internes nearly an hour. One gave the anesthetic, another made extension on the leg, while a third applied the plaster bandages. Such a tedious dressing was changed just as little as possible, and the patient was confined to the bed on his back for at least six weeks. We could tell very little as to what results we would obtain until the dressing was finally taken off, and a large number of unsatisfactory results were encountered. Since 1899 I have used the Hodgen splint with comfort to my patients and with good results. Dr. Brown has revolutionized the treatment of fractures of the femur in our section by introducing the Hodgen splint, and I believe it is used by all but one of the surgeons practising in Birmingham.

I know surgeons who were formerly internes in the largest hospitals in New York, Philadelphia, Pittsburg, and New Orleans, and who have had experience with the methods in use in these places, who, since locating in our city and observing the success of the Hodgen splint, have adopted it to the exclusion of all other methods of treating these injuries.

Dr. Brown (closing the discussion on his part).—In reply to the question asked by Dr. Carothers about putting the limb in a plaster dressing, if a man is perfectly comfortable in bed with a Hodgen splint, with the leg straight, what is the object in putting his limb in plaster? If there is any good reason for it I would not hesitate to fix the leg up in plaster and let him go after union was firm. I have not seen a patient who would not willingly lie in bed with a fracture of the thigh after the application of a Hodgen splint.

Dr. Carr (closing the discussion on his part).—I have been very favorably impressed with Dr. Brown's remarks with regard to the Hodgen splint, and I shall try it. I have not used it, however, in the past because I thought I got sufficient extension by other means. I have not been fortunate enough to make extension of the leg so as to get it its full length, except in the first twenty-four hours. In my experience, if you go over twenty-four hours, you will never be able by any weight to get the leg full length. But if done within twenty-four hours, ten, fifteen, or twenty-five pounds of weight will bring the leg out to its full length. I find that as soon as I

overcome muscular spasm by a heavy weight it gives more relief than if I put on a light weight, and that would be the only objection I can see to the Hodgen splint. But no matter what form of extension is used, if you get extension enough to overcome shortening within twenty-four hours, it will not take much weight afterward. The weight can be lessened on the second or third day.

In regard to plaster of Paris, I strongly advocate it in all other fractures. I use it almost entirely in other fractures. I use it in fractures of the thigh in young children. I have had a plaster cast on an infant's thigh for three weeks without it being soiled, at the end of which time the bone was pretty well united, and the result was very good. But I do not believe any man can get good results with plaster of Paris in the treatment of fractures of the thigh in adults, unless he first puts on some form of extension for two weeks. I frequently take off the splint at the end of two weeks, put the leg up in plaster of Paris, and let the patient go home from the hospital. Those I have kept in the hospital, and in which I have applied plaster of Paris, have usually asked to have Buck's extension put back, as they were more comfortable with it than with the cast.

Dr. Westmoreland (closing).—In regard to plaster of Paris or other splints in the treatment of fractures, every case of fracture is not suitable for the application of a plaster-of-Paris splint in the correct sense of the word. Many members of the profession fail in bandaging, and if a man cannot put on a bandage he cannot put on a plaster-of-Paris splint in a case of fracture of the lower extremity.

The ambulatory method of treatment of fractures, which was introduced a few years ago, did much harm for the reason that the patients with fractures were allowed to get up too early. I do not know of any text-book on fractures which gives sufficient time for the patient to be kept in bed, and that accounts for the many failures that are reported by different men. It is inconceivable to me how we can have a displacement of the bone or fragments if the plaster-of-Paris splint has been properly applied. If the patient is completely anesthetized so as to relax the muscles, I am quite sure spasm of the muscles can be practically overcome. There may be spasms of a few muscular fibers in the vicinity of the irritating points that are not controlled, but with extension you can

reduce the limb to practically its normal length. It is impossible to have trouble from the plaster-of-Paris splint when it is properly applied, and when rolled into the irregularities of the joint to which it is applied it is absolutely prohibitive of shortening or deformity. It cannot occur. It is a mechanical impossibility. Plaster of Paris has been the first splint of election. There are very few fractures in which its use is largely contraindicated, and those are chiefly intracapsular fractures. The weight of the splint in the aged is to some extent a contraindication to its use. But if the splint is changed it can be used in old patients to great advantage, and I make it a routine to change the plaster of Paris at the end of the second week—never later than that. I allow for emaciation or for any swelling at the time it is put on.

I read a paper before the Association in 1888, at which time I reported some twenty odd cases of fractures of the lower extremity. Having had considerable railroad surgery to do, which extended over a period of many years, and having had a great deal of the surgical work for employes in the different factories in and around Atlanta, which I have given up, I have had quite an extensive experience in the treatment of fractures of various kinds. In addition to that, there were then no hospitals in Atlanta to which these cases could be sent, so that nearly all cases of accidents that happened on the street or in buildings were brought to our offices to be treated. We got paupers as well as other patients. We treated them under various circumstances, and I have yet to see the first case in which there was any bad result from plaster of Paris. The plaster-of-Paris splint is the hardest splint I put on, and that is the principal reason why it is not used properly. It is the hardest piece of work I know of in surgery to put on properly.

RECENT ADVANCES IN THE TECHNIC OF THORACOTOMY AND PERICARDIOTOMY FOR WOUNDS OF THE HEART.

REMARKS INTRODUCTORY TO A SERIES OF DEMONSTRATIONS ON THE CADAVER AND WITH THE STEREOPTICON.

By Rudolph Matas, M.D.,
New Orleans.

A study of the combined statistics of the pre-operative period of cardiac surgery (Fischer, 1868; Loison, 1896; Salomoni, 1900) shows that spontaneous recovery, or a more or less permanent period of survival after injuries of the heart, can be expected in 15 per cent. of the cases; but that the number of recoveries is still very much reduced (to 10 per cent., Salomoni), if needle punctures (which yield 40 per cent. recoveries) are eliminated from the statistics.

On the other hand the latest writers who tabulate the operated cases, Wendel, Tscherniachowsky (1906), Lenormant (September, 1906), Salomoni (December, 1906), Rehn (April, 1907), practically agree with Salomoni's conclusions based upon his analysis of 160 cases which have been recorded in the literature since Farina's initial case in 1896. According to these statistics, the total number of recoveries after operations on the heart is 43.83 per cent. In 134 sutured cases there were 49 recoveries (38.75 per cent.). In 11 cases the heart was exposed without suture and 5 recovered (38.08 per cent.). Foreign bodies were recovered in 5, with 5 recoveries (100 per cent.). In 10 cases both the

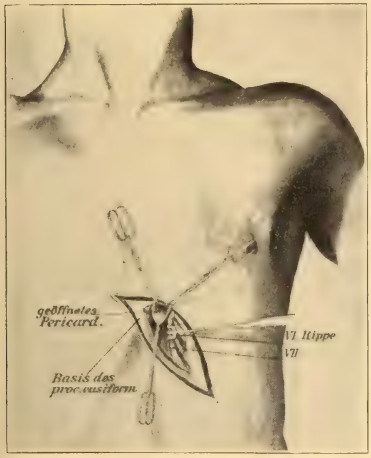
exact diagnosis and final issue are not stated (30 per cent.). As shown by Rehn before the German Surgical Society last April, 1907, the recorded mortality of cardiorrhaphy may be put down at 60 per cent., and the recoveries at 40 per cent.; that is, practically the mortality of laparotomy for perforating and complicated gunshot wounds of the abdomen. While the value of statistical conclusions must not be overrated, it may be safely concluded with Salomoni that heart wounds, far from being invariably fatal, give 3 chances in 4 for survival long enough to permit surgical intervention; 1 chance in 10 to heal spontaneously, and 1 in 2 to be cured by surgery. In the 49 recoveries recently analyzed by Rehn, the convalescence was uninterrupted and uneventful only in the minority of the cases. In the majority, the postoperative course was either critical for days, stormy, or protracted on account of intervening complications. Of the 75 fatal cases 16 died on the table or within an hour after the operation; 17 died in a few hours from shock and hemorrhage (*i. e.*, 40 per cent.), while 40 per cent. died of infection either of the pleura or pericardium, or both. Therefore, of these 75 fatal cases 84 per cent. succumbed to shock, hemorrhage, and infection.

Further progress in cardiac surgery can only be accomplished by methods which will diminish these three great factors in the mortality. The writer then discussed the most recent suggestions which give promise of decided progress in, at least, these three directions:

1. The diminution of shock by simplifying the preliminary thoractomy which gives the operator free access to the pericardium and the heart.

2. By methods of hemostasis which control the bleeding from the wounded heart itself, while the suture of the wounds is accomplished.

3. Methods which will diminish the tendency to fatal postoperative infection (*a*) by proper attention to asepsis, usually neglected in emergencies; (*b*) by prophylactic drainage of



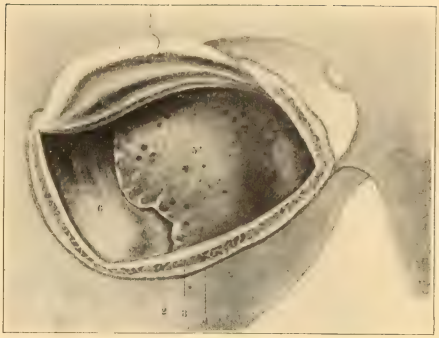


Fig. 1.—Rehn's Modification of Kocher's Exploratory Pericardiotomy. The sixth and seventh ribs and cartilages are retracted. The pericardium is brought out to the level of the skin; a small opening is made and the edges of the incision are held apart by the three clamps as shown in the figure. This operation to be preferred in all cases in which the coincident perforation of the pleura is doubtful. (From Rehn, loc. cit.)

Fig. 2.—Spangaro's Intercostal Thoracotomy (fifth interspace). After securing the mammary vessels, the intercostal space is increased by forcibly retracting the ribs and costal cartilages; more space is gained by carrying the incision upward along the chondrosternal junction as high up as may be necessary. The cut shows the pericardium and lung in situ (From Spangaro's article in La Clinica Chirurgica, No. 3, 1906.)

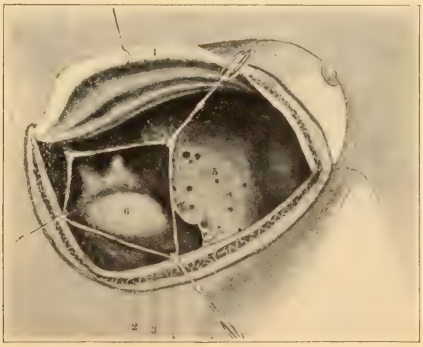


Fig. 3.—Spangaro's Intercostal Thoracotomy (fifth interspace). Shows the pericardium opened; the heart and great bloodvessels at the root exposed. (From Spangaro, loc. cit.)

the pericardium and pleura; (*c*) by immediate or early obliteration of the pleural space by the expanded lung, to avoid the dead space left by the retracted lung in pneumothorax (Noetzel's experiments). The author devoted special attention in his remarks to the improvements in the operative technique by which the exploration of the pericardium and the heart in actual or suspected heart injuries is most easily obtained, and concluded as follows:

All operable cases of heart injury resolve themselves into two great groups:

1. Suspected or doubtful cases calling for exploratory pericardiotomy. In these the heart lesion is only suspected or diagnosticated without any external wound in the anterior thoracic region, or in the immediate precordia. In gunshot wounds the bullet often penetrates the thorax at a distance from the heart (lateral, posterior, upper thoracic region, abdomen), in indirect injuries when sharp bodies penetrate through the esophagus, and in ruptures from indirect violence, falls, etc. In this group of cases the diagnosis of heart compression, etc. (from acute hemopericardium), should be confirmed by exploratory pericardiotomy. The procedure adopted should fulfil three requirements:

1. That the exploration should be satisfactorily effected by the most direct and simple method, with local infiltration anesthesia, at least, until the pericardium is opened.

2. That no complications should follow (pneumothorax) if the exploration should prove negative.

3. That it shall permit a free exposure of the heart by merely extending the lines of the preliminary exploratory incision. These requirements are met quite satisfactorily by a modified Kocher's operation which includes the resection of the left sixth costal cartilage, described by Rehn in April, 1907. (See Fig. 1.) This procedure differs from the still simpler methods of parasternal pericardiotomy recently described and applied for the drainage of the pericardium (Allingham and Pendlebury and Bacon) in the fact that

while these are perfectly adapted to cases requiring simple evacuation of pericardial effusions in pericarditis, they do not provide for the contingencies of cardiac surgery by extension of the original incision.

In the second group of cases a bleeding wound in the precordial or parasternal region (60 per cent. of the cases) already exists. This furnishes a direct guide to the heart, confirms the diagnosis of injury of this organ, especially when the outpour of foaming blood, a crepitating subcutaneous emphysema, as well as the physical and rational signs, suggest plainly that the pleura has been perforated in addition to the cardiac injury (80 per cent. of the cases). For these cases the intercostal incision in the fifth intercostal space, or an extension of the original wound as described and systematized by Spangaro, of Padua in 1906, is the best suited to meet the requirements of the case. (See Figs. 2 and 3.) When the external wound lies near the sternum the wound is merely enlarged and followed downward to the pleura in the middle of the intercostal space, to avoid the intercostal vessels. If perforation of the pleura is confirmed by the presence of air or blood in the cavity, the incision is carried at once into the pleural cavity and is continued horizontally along the intercostal space to a point 2 cm. of the left margin of the sternum, when the external mammary vessels are sought for and divided between two ligatures. The incision is then carried through the whole thickness of the interspace to the left edge of the sternum. The incision, always in the interspace, may be prolonged outward as far as desired, being rarely required beyond the anterior axillary line. Spangaro avails himself of the normal elasticity and mobility of the ribs to obtain a large view of the pericardium by *forcible retraction* of the costal cartilages and ribs above and below the incision. The intercostal incision, when forcibly retracted, will quite suffice to obtain a clear view of the pericaridum and of the heart. If more space is required for manipulation and exposure of wounds of the auricles or posterior surface of the organs,

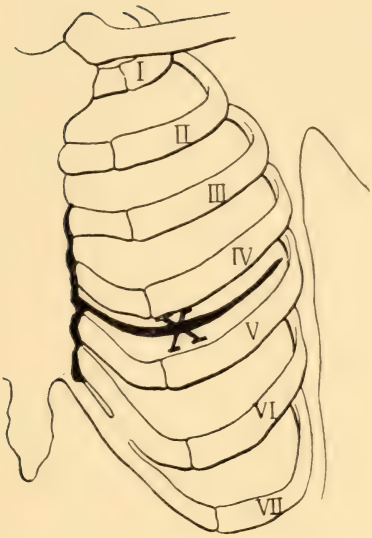


Fig. 4.—Diagram to show how the Spangaro intercostal incision can be amplified by making a chondrosternal disarticulation. This converts the simple intercostal incision into a horizontal, as Durante, Rehn, and others have suggested. By forcibly retracting the sternal angles of the incision, all the space required to expose the pericardium and heart can be obtained. When the interspaces are narrow and the cartilages and joints are ossified, this modification may be especially advantageous. The mark *X* indicates the theoretical position of a wound in the precordia.

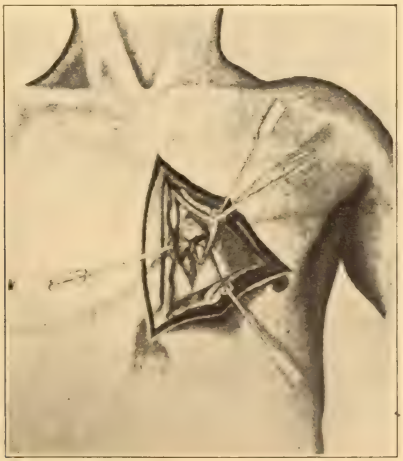


Fig. 5.—Shows the appearance of the wound after adopting the Durante-Rehn extension in a case of high placed penetrating wound; the pericardium and the heart are freely exposed by forcibly retracting the cartilages in the ribs at the divided sternochondral angles. (From Rehn.)

all that is necessary is to extend the incision upward along the chondrosternal junction to the second costal cartilage, or downward, following the edge of the sternum, to the sixth left sternochondral junction. (Figs. 4 and 5.) Wilms, in a recent case of successful suture of a perforating gunshot wound of the heart involving the ventricles, succeeded perfectly in suturing the wound on the anterior and posterior surfaces of the ventricles, and also in suturing a bleeding wound of the lung through a single intercostal incision. Through the fenestrum created by Spangaro's intercostal incision, the hand of the operator can enter freely into the chest and explore its contents. In addition, the diaphragm, lungs, and deeper recesses of the cavity can be explored *de visu*, by direct or electrical illumination. This method, originally suggested by Durante, and subsequently by Mikulicz and Sauerbruch in their efforts to resect the lower intrathoracic portion of the esophagus by posterior thoracomediastinotomy, and successfully applied by Wilms in his case of cardiorrhaphy, was independently planned and systematized by Spangaro and deserves to be known by his name. It has received the emphatic approval of Salomoni at the Congress of Italian Surgeons in 1906, and of Rehn at the meeting of the German Surgical Society in April, 1907, and also by R. Haecker in his very recent experimental study. This method entirely supplants all of the numerous and complex osteoplastic (trap-door) thoracotomies previously described by systematic and monographic writers on the subject, and is so simple and practical that it is surprising that it should not have been thought of and adopted long ago.

(The author then demonstrated Spangaro's operation on the cadaver and with lantern slides. In the same manner he presented a method of exploratory pericardiotomy which respected the pleura and was best adapted, in his opinion, to the exigencies of cardiac traumatisms when the diagnosis of penetration was still in doubt.) A great number of exploratory operations, which permitted a safe exposure of the peri-

cardium and evacuation of blood in the sac to relieve existing heart compression, and also allowed the surgeon to rapidly enlarge the primary wound so as to obtain free and easy access to the heart, had been suggested by many operators from the days of Larrey to the present time. The author confined himself to the modification of the operation suggested by Larrey and modernized in recent times to suit the conditions of this class of wounds by Mintz, Kocher, and Rehn. Rehn's modifications of Kocher's procedure was selected as the best type of these exploratory operations, and was described as follows:

A curved incision is made to follow the lower margin of the seventh left rib, about 6 cm. in length, toward the base of the ensiform process, passing obliquely across it. The incision is deepened in such a way that the seventh costal cartilage can be divided close to its sternal insertion. The mammary artery is spared. Crowding the soft parts aside, the finger penetrates under the sternum; between the lower portion of the triangularis sterni and the sternal portion of the diaphragm. The inferior sternopericardial ligament or band may serve then as a useful guide. The edge of the sternum and the adjoining seventh costal cartilage are removed with rongeur forceps, the sixth costal cartilage being resected, also, if necessary. By retracting the seventh rib and the sternum and then passing directly upward through the cellular tissue the pericardium is recognized in the interpleural space lying under a variable thickness of adipose tissue. The greater the fulness and tension of the pericardium, the easier is the operation. By working upward with the finger and under the sternum, injury to the peritoneum is also avoided. It is extremely easy, then, to open the pericardium and to inspect its contents. It is equally easy to close or to drain it thoroughly. The pericardium should be drained by an incision which will permit of the complete evacuation of both the right and left cul-de-sacs. If the pericardiotomy reveals a wound of the heart which is not accessible by the exploratory incision, the

incision is prolonged upward so as to permit of the division of the cartilages at the level of the third left chondrosternal joint. The vertical incision is then joined by an intercostal line, which, starting in either the fifth or sixth interspace, is prolonged outward toward the axillary line as far as may be necessary to mobilize an upper triangular osteoplastic flap, which, upon forcible retraction of the ribs, will allow a large exposure of the pericardium and its contents.

The writer also called attention to the importance of Rehn's recent suggestion, supported by Professor Gottlieb's (Heidelberg) experiments, to the effect that the most certain way of obtaining absolute hemostasis in large wounds of the heart, in which an enormous outpour of blood from either the auricles or ventricles threatens an immediate extinction of life on the operating table, is to seize the root of the heart on a level with the right auricle and compress the venæ cavæ at their entrance into the auricle. This compression of the auricular atrium can be kept up continuously or intermittently long enough, for a few seconds at a time, without fatal effect. Partial compression of the cavæ in the atrium is tolerated by dogs up to four minutes, probably even longer; total compression, positively up to one and one-half minutes; beyond this, uncertain (Gottlieb).

In his most recent experiments Haecker found that clamping of one vein exercised no notable influence on the severity of the hemorrhage from the heart wound. When both veins were clamped together the heart became almost entirely bloodless in a short time. The blood supply was not entirely cut off from the heart muscle by this procedure, for the reason that blood from the coronary vessels still continued to flow into the right auricle through the vena magna cordis, thus persistently maintaining a small circulation. Haecker was able to keep up the compression of the cavæ together up to *ten* minutes without fatal consequences to the animal. In consequence of the almost total and prolonged ischemia obtained by the temporary occlusion of the vena cavæ

Haecker was able to perform, with relatively little hemorrhage and with comparative ease, a number of experiments of great severity involving the introduction of bullets and other foreign bodies in the chambers of the heart, resections of the heart walls, and the artificial production of atypical valvular lesions in the aortic and mitral orifices, resections of the cavæ, and partial resection of the thoracic aorta, etc. Thrombosis of the cavæ never follows *temporary* clamping. After ligature of the superior and inferior vena cavæ alone, dogs will die in twelve or twenty-four hours with progressive lowering of the blood pressure. Digital compression of the cavæ, heroic as it seems, is less injurious than the violent massive compression and traction of the organ which several operators (Guinard, Villar, and others) have found necessary in order to stop the flow of blood.

In the presence of a profuse and persistent hemorrhage in the pericardium, it is the duty of the operator to inspect the entire surface of the heart up to the roots of the great vessels to make sure that he has secured the bleeding point. This can be done readily by the Spangaro incision. On the other hand it is often possible to permanently relieve hemopericardium threatening a fatal heart compression by simple pericardiotomy, the hemorrhage ceasing spontaneously (after the relief of the pericardial tension), in simple cases in which needle punctures or smaller myocardial wounds have been inflicted.

The question of traumatic pneumothorax and the need of keeping up the expansion of the collapsed lung when the pleura is opened is also very important. While it is a fact that in practically none of the cases of cardiorrhaphy, thus far reported, artificial means of inflating the collapsed lung have been applied and success has been obtained in spite of respiratory disturbances, as shown by the reported cases, and without the help of devices for keeping up artificial respiration, there can be no doubt that mechanical means of inflating the lung are of the greatest utility in many instances if judiciously applied

in these emergencies. In Germany and France the most prominent of recent writers, including Wilms, Rehn, Sauerbruch, and Haecker, have expressed themselves emphatically in favor of such appliances, and the results obtained experimentally by Sauerbruch and Haecker, with *hypo* pressure in Sauerbruch's chamber, bear out the conclusion that cardiac surgery can be made much safer when the respiratory function of the lung, on the injured side, can be controlled and regulated by such appliances. The writer is still of the opinion expressed by him for the first time in his paper on the "Surgery of the Chest," in 1898, that artificial respiration can be applied effectively and with the greatest simplicity for surgical purposes with an ordinary bellows apparatus of the Fell-O'Dwyer type, applied to the larynx by intubation; or, through a tracheotomy cannula, by a hand pump which he and Dr. John Smyth had devised and described in January, 1902. These simple appliances are just as effective and more accessible for emergencies than the complicated cumbersome apparatus invented by Sauerbruch for negative pressure, or by Brauer for positive pressure. They were also much more available and better controlled than the automatic pumps moved by electricity which are used in some physiological laboratories. The advantages of artificially inflating the collapsed lung after thoracotomy in cardiac traumatisms involving the pleura were: (1) Regulation and control of the respiration; (2) diminished shock; (3) improved circulation; (4) obliteration of the dangerous dead space left in the pleura by the collapsed lung. This most fruitful source of fatal pleural infection is diminished by inflating the lung while the thoracic wound is being sealed at the close of the operation, as shown by Noetzel's experiments. When inflation is not practicable an effort should be made to aspirate the air from the pleura after the thoracic wound is closed, unless drainage is deemed absolutely necessary.

Haecker, who has most recently studied the effect of artificial respiration in the treatment of heart wounds, attributes

much of his success to the help obtained in regulating the expansion of the lung while the animals were kept in Sauerbruch's chamber. He observes that hemorrhage from heart wounds is very materially lessened by the coincident collapse of the lung caused by the inrush of air when the thorax is opened. Therefore, the primary collapse of the lung from the pneumothorax is desirable in the first stage of the operation until the heart wound is sutured. After this the pneumothorax is harmful and dangerous, as the vigor of the heart's action diminishes and the blood pressure falls progressively as the open pneumothorax continues. As soon as the respiratory function is reëstablished by artificial means, the heart's action improves and the systemic blood pressure returns. These experiments, performed in Sauerbruch's chamber, are confirmed by the results of artificial inflation with the air pump or bellows which act by increasing the intrabronchial tension (hyperpressure principle). Dr. Smyth is at present conducting experiments on dogs which thus far fully confirm the theoretical advantages of simple positive pressure with our hand pump.

The general conclusions reached, after threshing out the evidence, is that artificial respiration with mechanical contrivances (whether on the positive or negative principle) is not required and may even prove injurious in the first stage of thoracotomy and during the stage of heart suture; it is of decided value in the terminal stages of the operation when the circulation and respiration both begin to fail and when it is necessary to obliterate the pleural space made vacant by the collapse of the lung.

References.

Wendel. Archiv f. klin. Chirurg., 1906, Band lxxx, Heft 1.

Tscherniachowski. Deutsch. Ztschft. f. Chir., 1906, Band lxxxiii.

Lenormant. Gaz. des Hôpitaux, September 13, 1906.

Salomoni. Tratt. Ital. di Chirurg., Milano, 1900, and Clinica Chirurg., December 31, 1906.

Rehn. Archiv f. klin. Chirurg., 1907, Band lxxxiii, Heft 3; Zentralb. f. Chirurg. Beilag., 1907, No. 31; Verhand, 26 Kongress Deutsch Gess. f. Chirurg., 1907.

Noetzel. Archiv f. klin. Chirurg., 1906, Band lxxx, Heft 3.

Kocher. Chirurgische Operationslehre V. Ed Jena, 1907.

Allingham, H. See Pendlebury, Lancet, London, October 22, 1904; II Ibid, 1903, 1, p. 798.

Bacon. Amer. Jour. Med. Sci., October, 1905, p. 625.

Mintz. Centralbl. f. Chirurg., 1904, p. 59.

Spangaro. La Clinica Chirurgica, 1906, No. 3; Archiv. Internat. de Chirurg., 1907, vol. ii, Facicul, 4.

Sauerbruch. Zentralbl. f. Chirurg. Beilag., 1907, No. 31.

Haecker. R. Archiv f. klin. Chir., 1907, Band lxxxiv, Heft 4.

Matas, R. The Surgery of the Chest (Chairman's Address, Louisiana State Medical Society, May 10-12, 1898, Proceedings for 1898).

Matas, R. Artificial Respiration by Direct Intralaryngeal Intubation with a Modified O'Dwyer Tube and a New Graduated Air-pump, in its Application to Medical and Surgical Practice. American Medicine, Philadelphia, January 18, 1902

DISCUSSION.

Dr. Harvey Cushing, of Baltimore.—It is a great compliment to be asked to say something in regard to Dr. Matas' scholarly and instructive paper. His presentation has been so interesting that I hesitate to speak lest I dull the delightful impression that his address has left.

It has been interesting to follow the development of operations on the heart. Beginning first of all with simple paracentesis for effusion, then advancing to free surgical opening with drainage of the pericardial sac in cases of suppurative pericarditis, and finally, subsequent to the Congress at Rome in 1896, operations began to be undertaken for injuries of the heart, particularly in cases of stab and gunshot wounds, as has been mentioned.

The experimental observations that I have been interested in during the past few years have carried this matter beyond the pericardium, beyond the heart muscle itself, to the interior cavities of the heart. The work done by my colleague, Dr. MacCallum, stimulated us to attempt to reproduce, experimentally, the valvular lesions due to chronic endocarditis. Dr. MacCallum's investigations have been directed

toward the study of the pulmonary circulation after the production of acute valvular lesion, and it occurred to us that possibly we might be able to produce these same acute lesions with subsequent recovery of these animals. This we have been able to do, and at present in the laboratory there are series of animals that have stenoses and insufficiencies of most of the cardiac valves.

Although these animals possessing known lesions are of value for clinical study by the students in the course on physical diagnosis, our primary object in the research has been to determine whether valvular operations promise to be at any time of value as practical surgical measures. I doubt not that at some time we may be able to enter the heart for the purpose of dividing the valves.

Sir Lauder Brunton, a few years ago, realizing that patients with "button-hole" mitral stenosis are condemned to a bedridden life, with return of compensatory failure on the first attempt to resume their occupation or take exercise, suggested that these lesions might possibly be relieved by surgical measures. This is what we have tried to do in our experimental cases of mitral stenosis.

Some interesting surgical points have come out of this study. In the first place it is necessary, on opening the thorax, to resort to some form of artificial respiration, and we find that a simple transverse tracheotomy, with the filling of the lungs, as usually done in the physiological laboratory, is the most satisfactory way. I do not believe that a cabinet or Brower apparatus, with negative or positive pressure, is as satisfactory as the simple method of tracheotomy and rhythmic inflation of the lungs with bellows and warmed air. The tracheal and cervical wounds are closed at once and practically never fail to heal by primary union.

Intrathoracic infections, however, are common in these cases for the reasons pointed out by Dr. Matas. In many of our cases, probably 50 per cent., there was subsequent empyema and in some of them subsequent pericarditis—at least this was so until it became a routine to administer urotropin before and after the operations.

Another point concerns the incision—a matter which Dr. Matas has fully gone into. While I have not carefully perused Rehn's and other recent papers published on cardiacs urgery, I am rather surprised to learn that an intercostal incision is

accepted as the incision of choice. We have found that the excision of a rib, as is done, for example, in the operation for empyema, furnishes the most satisfactory opening for our purposes, especially since we need ample room in order to approach the posterior surface of the heart. The rib can easily be shelled out of its periosteal covering for six or eight inches, and through an incision in the periosteal bed one can without difficulty separate the wound and gain free access to the thoracic cavity. It allows, furthermore, of very easy closure. I should think the closure, when the incision is made in the interspace, would be more difficult.

Another point concerns the intermuscular operation, and I believe that a similar method of approach, to that which we have employed on animals, is possible for man. This procedure, as carried out on the dog, consists of splitting the pectoral and rectus muscles so that one subsequently has a perfect gridiron covering.

I do not pretend to predict future operations on the cardiac valves in man, but by similar experimental observations the way was first paved for the earlier operations for traumatic injuries to which Dr. Matas has restricted his remarks.

Dr. Walter C. G. Kirchner, of St. Louis.—I have had opportunity in two instances of seeing operations on the heart for traumatism. In emergency work we must be prepared for this kind of surgery, and injuries of the cardiac region are met with more or less frequently. In both of these instances of injury to the heart there was profuse hemorrhage, but the wound in the heart was effectually closed with suture. Both patients made uninterrupted recoveries.

Incision is important in these cases, and, as Dr. Cushing pointed out, there may be no objection to the severing of one or more ribs to facilitate examination of the heart. In our experience a U-shaped incision with convexity toward the left has been found very serviceable, and with the section of one or two ribs the heart can be easily examined and manipulated. In the St. Louis City Hospital we have sutured the pericardium a number of times, and with this incision, by severing one or two ribs, perfect access to the thoracic cavity can be obtained. The incision may be closed completely, and when dependent drainage, which we have found usually advisable, is established, the ribs have healed as in ordinary fractures. We have seen several cases with good results.

Dr. Matas (closing).—I have very little to add to what has been said, except that I believe that while in a very considerable percentage of the cases, especially small stab and punctured wounds involving the anterior surface of the heart, can be successfully reached and sutured by the single costal resection referred to by Dr. Cushing, and which I have illustrated in the group of diagrams on the board, as "Ollier's incision," it is a safer and better plan in these emergencies to adopt the Spangaro intercostal incision, which involves a minimum of traumatism and can be quickly enlarged after the diagnosis is confirmed, so as to give the greatest amplitude for the necessary manipulations in the gravest and the most extensive traumatisms.

THE RELAXED KNEE-JOINT AND ITS TREATMENT.

By Albert H. Freiberg, M.D.,
Cincinnati, Ohio.

During the past few years great advances have been made in the diagnosis of the non-tuberculous chronic joint diseases and, in consequence thereof, in their treatment. These advances have been made possible by the use of the Röntgen ray, by the laboratory study of diseased joints, as well as by the material obtained by operations. Indeed, these operations themselves have been the source of much enlightenment. We have learned thus to distinguish and to recognize the clinical meaning of the different forms of infectious arthritis, and to separate the hitherto confused forms of chronic, atrophic, and hypertrophic processes in the joints. The significance and importance of the hypertrophied joint villi have become clear to us, both in their role of secondary factors and as the primary source of joint disturbance. At the same time there still remains a not inconsiderable number of cases which cannot clinically be included in any of these groups; they present no radiographic abnormalities; they are not infectious in their nature, and, objectively, they fail to give clinical evidence of enlargement of the joint villi. It is a part of these cases to which I would for the present attract attention, and in my own experience they concern altogether the knee-joint. The group of cases, to which I at present refer, have been most often alluded to under the caption of "functional" affections, and they have been de-

scribed by some excellent authors as joint neuralgias. A part of them, and not an inconsiderable number, are found to be the expression of joint strain and disturbance due to loss of the static equilibrium at the ankle and in the foot, the remoter results of the weak and flatfoot. That such knee symptoms, and even organic change of temporary character, may be the clinical manifestations of weak and pronated feet in the complete absence of subjective symptoms attributed to the feet, it has been my privilege to point out in a former paper. I shall not at this time allude further to them.

Etiologically considered, the cases with which we are more nearly concerned appear to divide themselves into two groups, according as they are thought to be the more or less direct result of trauma or not. So, too, are they, however, divisible into two classes, according to the nature of the symptoms presented, the one complaining of joint pain, altogether or largely dependent upon function of the joint; the pain is, for the most part, referred to the front of the joint, frequently under the patella. Ascending or descending steps is usually described as particularly painful, and after prolonged walking and standing pain may continue for some time after the joint is at rest. So, too, after unusual use of the joint, serous effusion may ensue to disappear promptly after abstaining from use for a while. The second group of cases, however, come with a recital of symptoms which are frequently remarkably like those of injury to a meniscus. They are characterized by the occurrence of attacks of very sharp pain, immediately followed by complete loss of strength in the joint, so that the patient often falls; upon moving the joint a few times the pain commonly disappears, but is followed by the development of an effusion into the joint. After a few days of joint soreness and sense of insecurity, the effusion vanishes and an interval of comparatively normal function ensues. Since these attacks usually happen in the absence of the surgeon, and since they are ordinarily of short duration,

there is not seldom doubt as to whether actual "locking" of the joint has occurred. In only two instances have I been able to witness the attack itself, and in both of these I was able to decide that the joint was not locked but simply held rigid because of the exceedingly intense pain. For the most part, in my cases, these attacks have not come on during considerable exertion, but rather when the patient was standing, off his guard, and with attention concentrated upon some occupation. In one of my most characteristic cases, that of a young woman, the attack occurred a number of times while dressing the hair.

If, in either of these groups of cases, the joint be examined in the interval between attacks and at the time when effusion is absent, a condition will be found which is so nearly normal that it is apt to be pronounced so unless the examiner has been put on his guard by the history and by his familiarity with its meaning. There is no swelling; tenderness may be entirely lacking or confined to a circumscribed space in the joint line, and thus easily overlooked; the excursions of the joint are normal and painless and *x*-ray photograms are absolutely negative in showing any abnormal condition. There is none of the grating so characteristic of villous hypertrophy in the most typical of these cases; it is found not infrequently, however, and must then be looked upon as the indication of such enlargement of the villi as a secondary process.

That which is characteristic of the cases under discussion is an atrophy of the quadriceps extensor of the thigh; a shrinkage in volume, which is usually to be perceived by the eye, if looked for in comparison with the other limb and certainly to be ascertained in more definite terms by the use of the tape line. In this quadriceps atrophy and the weakened power of extension caused by it, we have then the chief mark of the joint condition from a clinical standpoint; but it is also explanatory of the pathology of the affection and of its etiology.

In my cases the difference in circumference of the thigh just above the knee has varied from one-half to one inch. In several cases the circumference of the calf was also less than that of the normal side. In the greater number this was, however, not so. It is necessary to be accurate in the method of measurement in order to avoid self deception, and particularly so in attempting to estimate the influence of treatment. On account of the conical shape of the thigh, the measurement must be made at precisely the same level on both sides if error is to be avoided. I accomplish this by having the patient stand before me; a carpenter's level being held against both thighs with the spirit bubble centred, a horizontal mark is made at exactly the same height on both sides with a skin pencil. The level being put aside, the circumferences are now taken, the tape being carefully adjusted to the same degree of tension. In this manner all practical error may be avoided.

Having recognized the atrophy of the quadriceps as the one external, physical sign of this joint affection it will require only a thought of the physiology of the knee-joint to explain the symptoms. The quadriceps is normally the "tensor" of the knee-joint capsule. In its atrophied and, therefore, weakened condition it fulfils its duty in this respect so imperfectly that instead of being held taut to the normal extent the capsule remains relaxed during movement, and is thereby subjected to repeated traumatisms by getting squeezed and pinched between femur and tibia. It is natural to expect the character of the symptoms to depend upon the degree of relaxation and, therefore, upon the extent to which the capsule falls into folds. If, as is likely in the absence of correct diagnosis and treatment thereupon consequent, this condition exists for a considerable length of time the repeated traumata followed by inflammatory reactions are likely to produce a chronic state of hyperemia in the joint capsule; this in turn causes the enlargement of the fat tabs of the joint and the so-called villous arthritis, with its characteristic grating, is before us.

Granting that the existence of the quadriceps atrophy is recognized and its role in producing this symptom complex acknowledged, the question of its cause becomes uppermost. In several of my cases the history of trauma to the joint was evident. In four of my cases, however, the patients denied having suffered injury to the joint until I insisted upon the importance of apparently slight trauma. In all of them I was then finally able to determine a traumatic factor, a severe bump against a chair, a bruise, a twist of the knee at playing handball, a fall upon the bent knee. I, therefore, look upon this atrophy as due to trauma of the joint or at least in its neighborhood, and I believe at the same time that my cases furnish evidence of the reflex nature of this atrophy.

This is the more interesting since experiments upon animals have recently caused Bum,[2] Firgan,[3] and others to favor the theory of "inactivity." However, in view of the fact that in several of my cases the limb was used in the ordinary manner without intermission from the time of injury, the conclusion would seem permissable that not only must the atrophy have been of reflex origin, but, also, that trauma of comparatively slight degree is capable of bringing this about. I am strengthened in this belief by cases of very similar kind reported by Paalzow,[4] Caspari,[5] Heidenhain,[6] and Hoffa.[7] I shall abstain from further discussion of the manner in which this reflex atrophy is produced, as being unfortified to a sufficient extent by facts, and, therefore, of too purely theoretical interest.

In hospital and private practice I have been able to observe nine cases whose clinical characters I have attempted to portray in the foregoing description. The narration of these histories I shall omit as adding nothing to the value of this report. As the result of this experience, however, I feel justified in advocating the description of the "relaxed" knee-joint as a distinct syndrome, and not simply as a feature or variety of villous arthritis. On the one hand, a number of these cases of relaxed joint fail to present evidence of villous enlargement at any time; on the other hand, villous enlarge-

ment is very frequently seen as a manifestation secondary to joint inflammations of various kinds and even to tuberculous disease.

In view of the fact that muscular atrophy is so frequently the accompaniment of chronic joint diseases, but especially since the trauma causing the muscular shrinkage may have done deeper damage to the joint, even to the extent of injuring a meniscus, it may be surmised that accurate diagnosis is frequently far from easy. The hope that the newer method of examination by the *x*-ray after distention with oxygen, would enable us to determine accurately an injury of the meniscus, has also proved to be vain. Wollenberg[5] has come to this conclusion after exhaustive experiment. In my experience the most valuable point in distinguishing between the relaxed knee and that with injured meniscus, is the fact that in the latter condition the subsidence of joint disturbance between attacks is apt to be incomplete; some swelling of the capsule is likely to remain and some limitation of motion at the extremes is nearly always present. That these conditions will be found in long-standing cases of the relaxed knee as the result of secondary villous hypertrophy is self-evident, but here we have also the physical evidences of villous overgrowth. From the foregoing it must be apparent that occasionally exact diagnosis is a matter of no mean difficulty and calling for nice judgment. It is preëminently a diagnosis "by exclusion."

Once having accepted the above explanation of the nature of the class of joint symptoms under discussion, the therapeutic indications would seem to be clear enough. If the atrophy of the quadriceps and the relaxed condition of the jiont capsule are responsible for the symptoms, then vigorous measures toward restoring the muscle to its normal strength and volume, toward improving the circulation in the capsule itself, must result in bringing about normal conditions again. Accordingly we devote ourselves to an energetic course of treatment by gymnastics; resisted extension of the leg upon

the thigh, exercises upon suitable apparatus looking toward the development of the quadriceps in particular, faradic stimulation of the muscle, vibratory or manual massage, alternate hot and cold douches, etc. When we have by these means succeeded in restoring the volume of the muscle to the normal, the symptoms will have disappeared. Usually this will be accomplished in a period of six to ten weeks, and having instructed the patient to continue some simple home exercises for a longer period he may be practically dismissed from treatment. In some cases, however, the recovery is not so simple or so rapid. Despite our best efforts the return in strength and volume of the extensor is so slow as to greatly try the patience of the patient and the faith of the surgeon in his diagnosis. This has also been the experience of others. If has furnished ground for the theory that injury of considerable moment has been done to the spinal centres. Caspari is inclined to lay stress upon the effect of concussion at the time of injury, and upon the central nervous system. One of my cases would seem to lend strength to this view since the patient, who was a locomotive fireman, was injured in a wreck and gave every evidence of having sustained damage by great violence. Two of my patients were pronounced neurasthenics before the injury, which might thus have acted upon a nervous system which was more than commonly susceptible. These three patients were the ones in whom the recovery was more than ordinarily slow, requiring in one case a period of six months. However, in all of my cases complete and lasting recovery ensued by persistent use of the methods above mentioned and aided in some by measures looking toward improvement of the general health. The rather common practice of ordering elastic bandages and knee caps for these cases is to be deprecated; it can only serve to delay the disappearance of the muscular atrophy.

In summarizing it seems fair to say:

1. That many cases of so-called "functional" knee symptoms are due to reflex atrophy of the quadriceps extensor following injury.

2. That the term "relaxed knee-joint" should be reserved for such cases.

3. That the injury may be so slight that its etiological relation may be overlooked.

4. That the atrophy following injury in many cases, cannot be explained by the theory of "inactivity."

5. That in the cases under discussion, the cure will be brought about by the restoration to normal volume and strength of the quadriceps extensor.

6. That in some cases the recovery is so protracted as to warrant belief in material damage to the central nervous system.

7. That while in such cases our endeavors are necessarily limited to treatment at the periphery, ultimate recovery may be expected to follow persevering and well-directed effort.

REFERENCES.

1. Freiberg. Cleveland Journal of Medicine, July, 1901.
2. Bum. Centralbl. f. Chir., 1905.
3. Firgan. Archiv. f. Unfallheilk., Band ii, p. 167.
4. Paalzow. Deut. Militärärztl. Zeitschr., 1899, Heft. iv.
5. Caspari. Arch. f. Unfallheilk., Band i, p. 219.
6. Heidenhain. Monatsschr. f. Unfallheilk, 1894, No. 12.
7. Hoffa. Therapie der Gegenwart, 1903, 1.
8. Wollenberg. Zeitschr. f. Orthop. Chir., Band xix, p. 253

DISCUSSION.

DR. C. E. CALDWELL, of Cincinnati.—I do not wish the paper of Dr. Freiberg to go undiscussed, because the subject is so interesting. I confess to having had a limited experience with this class of cases, owing to the fact that my attention has not been sufficiently called to it, but since it has I can recall several of these cases, one of which occurred in a professional cello player. He was a marked neurasthenic and had the characteristically relaxed knee. He was subject to painful knee due to this relaxation, or, probably, to his faulty attitude. This man came to me a number of years ago on account of

this relaxed and painful knee. I could not find anything, nor any internal derangement, and attributed it to his neurasthenic condition. Subsequently this man became tabetic five years after he had passed from my observation, and eventually died of tabes. It is interesting to notice that the neurasthenic condition and relaxation of the knee preceded the tabetic condition so long.

I recall another case of relaxed knee in a rather nervous, neurasthenic woman, the mother of one child. The peculiarity in her case is that this condition of relaxation of the knee seems to come on at about the menstrual period, and she has called my attention to the intervals in which she is free from pain, but at the menstrual period, when this relaxation of the knee takes place, I can feel a distinct hernia in the popliteal space, which I cannot account for on any other ground than that she has an intermittent hydrops. This is a very interesting condition, and, perhaps, these cases do not bear particularly on Dr. Freiberg's series of cases.

A man, weighing 220 pounds, two or three years ago, in attempting to get on a car slipped and fell, rupturing some of the fibers of the crureus muscle. There was succeeding atrophy of this muscle and very marked relaxation of the knee-joint. Since then he has worn a rubber bandage almost continually to prevent falling.

I am very much obliged to Dr. Freiberg for calling our attention to this class of cases in such a thorough way.

Dr. Robert Carothers, of Cincinnati.—I do not rise to discuss the paper of Dr. Freiberg, because it is so thorough and complete that it needs no discussion, but I want to say a word or two to the effect that papers like this and similar papers exert great influence, and will some day do away with the American disease called neurasthenia. I believe that a great many of our cases of neurasthenia, so called, if properly looked into and thoroughly discovered and worked out, would be found to be due very largely to some obscure or unaccountable condition that will be cleared up in the manner that has been pointed out.

I had a little experience last summer while in Boston, which started me to thinking. At the invitation of Dr. Robert Lovett, with others, I spent an evening at his offices, and among those present were his masseuse, whom he brought over from Hoffa's clinic in Germany. She was kind enough

to give us a demonstration of the manner in which she conducted her exercises and massage. During the evening in some way the subject of neurasthenia was brought up in connection with the work she was doing. She said in her German accent, "Oh, that neurasthenia! I never saw a case until I came to America. We do not have it in Germany." This was the cause of my doing some thinking. I know in America we have Germans who have it more or as much as we Americans. I said to myself either the Germans do not recognize neurasthenia or there is something back of our cases which we do not recognize, and are willing to let them pass as neurasthenias.

A day or two afterward, in talking over the matter with Dr. Goldthwaite, I remarked to him my conclusion, and he said, "You have hit the nail on the head. We do not recognize them." It is the minute, the little things we eventually figure out and correct. Some of the more minute things, as described by Dr. Freiberg, if corrected, will cure our neurasthenics. Dr. Goldthwaite also remarked to me that in going back for five or ten years over the histories of his cases, he found the words "diagnosis, neurasthenia," appearing very frequently in the records, while now they appeared very rarely. In fact it was an exception at the present day to see a diagnosis of neurasthenia on the record sheets.

SOME REMOTE SYMPTOMS AND EFFECTS OF CHOLECYSTITIS.

By A. Morgan Cartledge, M.D.,
Louisville, Ky.

I have been greatly impressed for many years with the pathological changes occurring in the various tissues and organs of the body as the result of chronic inflammatory disease of the gall-bladder or ducts. As the result of much clinical work and many observations the diagnosis of gall-bladder disease has been greatly elucidated, yet I feel that there is much to be learned along diagnostic lines by a closer study of the remote effects of disease in the gall-bladder and ducts.

It will be the object of this communication to call attention to the remote effects of cholecystitis, and the tremendous bearing this disease has as a causative factor in destructive disease of other and more important organs. There is a great paucity of literature upon this subject, and, like many other phases of modern pathology, remained for the modern abdominal surgeon to clear up and establish as the result of his daily work and observation. It was my fortune to become identified with a not inconsiderable number of gall-bladder cases early in my professional work, and have been observing with the greatest interest the effects of gall-bladder disease upon the heart and kidneys, especially the latter. Years ago I was impressed by the fact that practically all the gallstone cases gave albumin reactions in the urine and more or less casts. This was a source of great anxiety to me, until I learned that

the kidney changes promptly disappeared after operation in all except the more aggravated or very long-standing cases.

As early as 1894 I observed and called attention in a paper read before one of our local societies to the great prevalence of cardiac changes in cholecystitis. These at the time were considered the result of bile circulating in the blood and the functional manifestation so common as the result of a sympathetic reflex through the pneumogastric. I now have every reason to believe that most of the cardiac symptoms and changes found in gall-bladder disease is secondary to the renal changes produced by the elimination of irritating substances in biliary infections. However, I am not sure that all the changes in the heart are caused in this way. The number of endocardial changes in chronic biliary infection are too pronounced to be coincidental, and the long-continued, though slight, amount of bile circulating in the blood undergoes such chemic changes as to produce endocardial proliferations, and, finally, interference with consistent valve action.

There is no literature directly on the subject as far as I have been able to learn. The following points are in the nature of sidelights, and may be interpreted as bearing in some way on the subject. I am sorry that the time is so short that we cannot make some laboratory experiments upon the subject.

Analogies. (*a*) Nephritis is a constant complication of diphtheria. It has been experimentally produced in guinea-pigs by inoculating them with the toxines of diphtheria. (Osler, *Infectious Diseases*, p. 414.)

(*b*) Nephritis occurs in acute rheumatism. The diplococcus is freely excreted in the urine of persons suffering with acute rheumatic pericarditis. Nephritis may be produced artificially in rabbits and cats by the inoculation with the diplococcus as observed by Pain, Osler, and Vernon Shaw. (See Osler, p. 701.)

(*c*) Kidney complications occurred in 6, in a series of 1674 cases of erysipelas.

(*d*) Typhoid fever, typhus fever, smallpox, and lobar pneumonia.

From these facts it is not unreasonable to suppose that the same complication may follow cholecystitis.

THE ROLE AND COMPOSITION OF THE BILE.

Water	91.68
Mucus and pigment	0.129
Glycolate of sodium	3.03
Taurocholate of sodium	0.87
Soaps	1.39
Fat	0.73
Lecithin	0.55
Cholesterin	0.35

Bile absorbed by the lymphatics gets into the circulation where it undergoes uncertain chemical changes which result in the formation of toxalbumins. The symptomatic effect of this is to produce slow pulse, slow respiration, low temperature, irritation of the skin, lassitude, headache, and coma. Is it then possible for the delicate renal mechanism to escape?

When the liver is altered the extractive matters accumulate in the blood. Biliary albumins may produce the following effects:

(*a*) Alteration of fixed kidney cells.

(*b*) Reflex vascular disturbances.

(*c*) Exudation and diapedesis.

Microbic poisons are albuminoid while circulating in the blood, but in the urine they are alkaloid. May it not be the function of the kidney, under these conditions, to break up the complex albuminoid molecules and convert them into alkaloids? Now should an organic radicle be replaced by a H atom, a poison is produced. (Roger, p. 133.) The chemical composition of bilirubin is $C_{16}H_{18}N_2O_3$. Bilifuchsin is: $C_{16}H_{20}N_2O_4$. Biliprasin is: $C_{16}H_{22}N_2O_6$. These organic radicles combined with Ca form biliary calculi, but if one of these radicles should be replaced with a H atom, a poison is formed. Example: nascent H converts bilirubin

into $C_{32}H_{44}N_4O_7$ (orobilin) or in the feces, stercobilin. Taurocholic acid is an example of the substitution of an organic radicle by a H element: $C_2H_2H_4SO_2$. (Bartlett, *Organic Chemistry.*)

Musser says that albumin can almost always be found in the urine in cases of infected gall-bladder.

Cases of acute infectious icterus of a benign form have long been recognized, and epidemics described by French observers, and by Weiss in 1866.

In 1886 Weil emphasized the acute onset, extreme development of jaundice, tender and enlarged spleen, and accompanying nephritis.

Jaeger described a bacillus of the proteus group as the pathogenic factor in a garrison epidemic at Ulm in 1892. He named it the bacillus proteus fluorescens.

"In infectious icterus the kidneys show a diffuse tubular nephritis." (Weil.) "The albuminuria is usually of a considerable grade, and hyaline and granular casts are present in large numbers. The urine also contains bile pigments and sometimes red blood cells." (Weil.) "The nephritis gradually clears up." The tendency to hemorrhage from the various organs and mucous membranes of the body has long been noted as a result of long-existing icterus. This is evidently twofold in its nature; occurring from the operative wound, as it sometimes does, the element of mucous admixture which retards coagulation is a factor. But the altered bloodvessels and circulatory stasis is no doubt the chiefest cause. Short of pronounced jaundice there is a tendency to bleed freely from mucous membranes in chronic catarrhal disease of the gall-bladder. I have been able to establish a clear relationship between gallstones and menorrhagia; where a thorough examination fails to reveal a local source of an existing menorrhagia I strongly suspect a lesion of the gall-bladder, probably calculi.

Very slight, I may say imperceptible, increase in the absorption of bile will increase the normal menstrual flow. In my

experience it requires rather aggravated icterus to give rise to kidney hemorrhage. In the aggregate, symptoms caused by the circulation of bile in the blood, we have the clinical picture of so-called biliousness of the ancient authors and of the laity today, viz., headache, drowsiness, fatigue, furred tongue, neuralgia, cold feet, and constipation. This combination of symptoms, really toxic in character, has the greatest significance for the surgeon or interne. What is biliousness so called? Simply the retention in the blood of toxic substances of varied origin. It has no connection with the liver proper, but it is an evidence of trouble in the biliary passages or gall-bladder, viz., absorption of bile from impeded outlet, this absorbed bile in turn irritating the kidneys, which interferes with the elimination of important toxic principles from the blood—these toxic principles being the ordinary ones eliminated by normal kidneys plus those added by the bile, directly and indirectly, for indirectly we have many stercoraceous ferments formed, the absorption of which still further hampers the kidneys. Where the ancient portion of calomel relieves in part this condition, it does so by removing part of the intestinal ferments and indirectly lessening the burdened kidney, also, directly, by increasing the kidney action. The logical deduction from the premise, which practical experience abundantly proves, is that recurrent biliousness, so called, is a positive indication of gall-bladder disease most likely extending to the ducts.

What we want, for a time, is less about cholelithiasis and more about chronic cholecystitis and cholangitis; these are, in my judgment, as numerous as where calculi form, and between the two a startling chapter figure it makes in human pathology. I dislike to appear to speak immodestly, but truthfully I do not believe the half has been told. Fourteen years and one month ago it was my privilege to state, at the meeting of this Society in this city, that "we should consider any appendix once so affected as to deserve the name of appendicitis, whether from tubercle or trauma (enterolith), a

lastingly diseased structure and fancied cures but quiescent states the result of very easily recognized conditions." These views were considered too radical that day. I venture to say the same of inflammatory disease of the gall-bladder and ducts today. If I can be cured of infections of the gall-bladder and calculi by medicinal agents I do not want to be cured that way. I want the gall-bladder and ducts drained, so as to get a lasting cure. I would wish to avoid cardiac and renal changes, which are inevitable and finally fatal.

The internist should take a large pencil and score down syphilis, alcohol, and rheumatism as causes of Bright's disease, and raise chronic infections of the gall-bladder from cholelithiasis and other causes to first place.

The recurring bilious, and those with inherited liver disease, headache, and malaria, should have a simple cholecystotomy and drainage. Likewise the dejected and melancholic. In addition to the usual symptoms of gall-bladder disease, many valuable diagnostic signs can be found in the enormous category of remote symptoms and effects.

DISCUSSION.

Dr. Robert T. Morris, of New York City.—Perhaps Dr. Cartledge lays too much stress upon the nomenclature of cholelithiasis. I believe it is important to consider these cases as instances of cholecystitis with the presence of calculi merely incidental. Calculi may or may not be present, and yet a patient suffers from the infective feature of the cholecystitis at first, and subsequent to the infective feature we have the secondary changes with desquamation of the endothelium from the peritoneal side—plastic oxidation—the formation of adhesions which involve the hepatic flexure of the colon, the pylorus, and other structures in the vicinity, and irritate the great sympathetic ganglia of this region. That is the important point I believe in these cases. Not primarily the absorption of toxins from the gall-bladder and ducts, which

does occur; not primarily the absorption of bile and poison, which does occur, but primarily the irritation of the great sympathetic centres, the semilunar ganglia, by the presence of the adhesions which follow the cholecystitis. We stand to-day with regard to gallstones where we stood twenty years ago with regard to appendicitis. Twenty years ago the question came up whether or not we should operate on a certain case, and someone would ask, Do you believe there is something in the appendix? Another one would say, No. In that case, then, don't operate. The question as to whether to operate or not on cases twenty years ago hung on the point as to whether there was something in the appendix The biggest thing that ever entered an appendix is a bacterium, and the same may be said with regard to the gall-bladder. The presence or absence of a stone or stones is incidental, and we must relegate it to that position and consider it as unimportant. Operate for the bacterium and find out whether gallstones are present or not, merely as a matter of secondary importance.

Dr. Mack Rogers, of Birmingham, Ala.—I have recently had occasion to refer to a paper read before this Association a year or so ago by our distinguished member, Dr. Richardson, of Boston, entitled "Gallstones without Symptoms, and Symptoms without Gallstones." The title of the paper tells the tale. Dr. Morris, I think, is eminently correct in the position he takes. But my point is this, that we frequently have these gall-bladder troubles without them manifesting themselves in such a way as to enable us to recognize them. The essayist has brought that out very clearly; but I have recently had two cases that made an impression upon me. One of these was an ectopic case in which I detected a gallstone by exploration. The other was a case where we had prolapse of the ovary and appendiceal trouble. We removed the gallstones. In these cases gallstones had never been suspected, yet the patients had been suffering for years and years, and no one had ever suspected the real source of cause of the trouble. The ectopic in the one and appendix in the other led to the discovery of them. I simply wish to emphasize these facts that we so frequently have these troubles unrecognized; the patients are practically invalids for years, and their trouble is not discovered except incidentally. Any disturbance of the functions of the stomach

and bowels should cause a close investigation of the biliary apparatus.

Dr. Charles M. Rosser, of Dallas, Texas.—There are not now so many unrecognized cases of gallstone accumulation as formerly, but many of unrecognized gall-bladder disease. Dr. C. H. Mayo a few years since replied to an inquiry of what to do for a patient having neuralgia of the stomach, by advising the doctor to remove gallstones. This was an expression of his belief that actional paroxysms are not necessary to demonstrate gallstones. During the present year I have observed a number of cases in which simple drainage of gall-bladder, in which there were no stones, but catarrhal and infective processes present, relieved conditions previously called indigestion, biliousness, malaria, etc., and treated for such troubles to no purpose. This is a class of cases to which surgical help must be also applied.

Dr. Charles H. Mayo, of Rochester, Minn.—I will speak briefly not of the known organic diseases caused by disease of the gall-bladder, which the paper has so well described, but of some of the reflex troubles arising from the same cause.

Years ago the oculists foisted upon our attention the question of reflexes and the cures of headaches by the proper fitting of glasses. Occasionally a case was reported in which the epilepsy was said to have been cured by this means. This question of reflex trouble is not infrequent in connection with the young, pregnant woman, who come to the office complaining of sick stomach and of vomiting. After inquiring into the question of the previous menstruation, and it is found to be a case of pregnancy—such cases are not operated for stomach ulcer. And so the gall-bladder surgery has reached the period where it is no longer a question that we must have colic and classical symptoms, but cholecystitis and the presence of stones is secondary, as Dr. Morris has pointed out. There is no question but that gall-bladder trouble is the cause of a great deal of stomach disturbance. Only a very small percentage of those individuals who come to us thinking that they require surgical interference upon the stomach really have any necessity for surgical operation upon that organ. A small proportion of them really have trouble with the stomach as an organic condition, but in many gallstones are present; and a still larger number of them have troubles with the appendix causing pylorospasm.

Dr. Alexander Hugh Ferguson, of Chicago.—While I thoroughly agree with the author of the paper, and with what has been said regarding the importance of infection of the gall-bladder and tract, I would like to draw attention to the fact that disease in another part of the abdominal cavity sometimes refers its symptoms to the region of the gall-bladder; that the gall-bladder region is occasionally opened and nothing found to justify its drainage; but if the examination is extended a little farther, you will probably find that there is chronic appendicitis, a pyosalpinx, kidney condition, or something not suspected.

Upon opening the gall-bladder region the intra-abdominal structures, gall-bladder, etc., should be inspected before the hand is passed to feel them. Chronic infection of the gall-bladder contracts it and may by adhesions drag the stomach, duodenum, omentum, or intestines toward it. When the primary source of infection is not in the gall-bladder but in any one of the surrounding structures and adhesions have formed, then the gall-bladder is drawn toward the primary source of infection. When the gall-bladder cannot be emptied by hand pressure it should be opened and drained. Flexion of the gall-bladder is treated in a similar manner.

It is a well-known clinical fact that foreign bodies which enter the peritoneal cavity by way of the pelvis find their way into Morrison's pouch, and so does infection travel toward the gall-bladder and liver from the female pelvic organs or from the appendix. In operating on chronic cases of gall-bladder disturbances, I should like to emphasize the wisdom of thoroughly exploring the other abdominal organs with the hand when at all permissible.

Dr. Rufus B. Hall, of Cincinnati.—The remarks of the last speaker prompt me to say a few words on the duty of physicians before these patients are explored. I do not think it is fair to the patients to make these explorations and say that "I expect to find the trouble in the gall-bladder, if I do not find it in the appendix, the kidney, or a pyosalpinx." We should be able to know and we can know. With a clinical history there is pathology. If we have a pyosalpinx to deal with, the surgeon ought to say to the patient, You have pyosalpinx, whether you have gall-bladder disease or not. In certain conditions of the appendix the pathology may not be so marked. There may be chronic appendicitis, and this

may confuse the surgeon in his diagnosis of appendicitis or disease of the gall ducts. This can hardly be said to be true of the kidney. We should be able to differentiate between disease of the kidney and the gall-bladder, or between disease of the kidney and appendicitis. I think we owe that to ourselves as well as to our patients.

Dr. I. L. Watkins, of Montgomery, Ala.—I want to say a word or two in regard to the errors caused by reflex symptoms referred to. Many of these cases are not carefully considered by the man making the examination, or the condition is not, otherwise, properly studied, and under these circumstances it is easy to fall into error. I will report an instance of this character.

Recently I was invited by telegram to go to a neighboring town to operate in case of gallstone. On reaching the home, I found a lady, aged sixty-three years, apparently very ill, all ready for the operation. On entering the house the attending physician handed me a telegram from her physician in New York, saying: "Get a surgeon and have her operated on at once for gallstone." It was also stated that she had passed large numbers of gallstones recently while in the care of this physician. The general appearance was that of one with peritonitis—general distention with pain around the lower costal border and great pain from palpation, so much so until it afforded no assistance in the diagnosis. On vaginal examination the pelvis was found to be filled with deposit, but its character could not be determined. It was clear that she had peritonitis. Notwithstanding the danger of losing a nice operation, I stated to the patient that the cause of her trouble was below the umbilicus and that gallstones had nothing to do with her trouble and that I would advise an immediate operation. After some doubt and delay the family agreed, and the operation was performed the following day. The condition found was a large cyst adenoma of the right ova, the size of the head of a two-year-old child, and cystic degeneration of the left ovary; a great many adhesions showing that numerous attacks of peritonitis had formerly existed. The gall-bladder was found normal and no stones could be found.

While the pain was referred to the region of the gall-bladder, it was most certainly due to localized peritonitis with accumulation of gas, making pressure in this region, and the gallstones passed were probably the result of sweet oil administered

for their relief. The absence of any history of pelvic trouble, and the statement of the patient that her pain was in the subcostal region naturally attracted attention to this first diagnosis, but the most superficial examination of the pelvic organs would have pointed out the error.

I do not regard this as a case of reflex symptoms, but a not uncommon error.

Dr. Cartledge (closing).—I wish to thank the gentlemen for their discussions. With your permission I will change the title of the paper to "Some Remote Symptoms and Effects of Chronic Cholecystitis," because I dwelt on those features. I simply wanted to impress upon you the far-reaching effects of gall-bladder disease, with pathology manifesting itself elsewhere, and I firmly believe that if in the next year those who keep careful records, will go back over them, they will find many cases of gall-bladder trouble in which there will be found on examination of the urine casts and albumin. The logical deduction, therefore, to be drawn is this, that chronic cholecystitis, whether from gallstones or from simple chronic infection by bacteria, if long continued, produces disastrous consequences far remote from the gall-bladder itself. Where we depend upon gallstone colic and stomach trouble to make a diagnosis, we must get certain kidney changes associated with the recurrent attacks of so-called biliousness, and these cases should be operated on more promptly than they have been in the past if we would ward off the secondary pathological changes that are likely to take place in other organs than the gall-bladder and ducts.

SUTURE OF THE URETHRAL AND VESICAL SPHINCTERS FOR THE CURE OF INCONTINENCE OF URINE, WITH A REPORT OF A CASE.

By Hugh H. Young, M.D.,
Baltimore.

The case I wish to report today is that of a young man, aged thirty years, who came to me on January 30, 1907. The history given was briefly this: Eighteen years ago he had an attack of gonorrhea from which he completely recovered in a month. His urinary and sexual powers were normal. Six years ago, following an injury, he had cystitis which caused him much pain, and after that he suffered greatly with frequency of urination, pain in the urethra and bladder, but no incontinence, and no difficulty in voiding urine. Fifteen months before he appeared at my office he consulted a surgeon in another city on account of this chronic cystitis. He said he was at that time voiding frequently, was suffering great pain, so that a perineal operation was advised and carried out. As far as I can understand from the patient's description, the operation consisted of an external perineal urethrotomy with the insertion of a large tube into the bladder through the perineum. As the symptoms persisted after the operation the drainage tube was left in the perineum for three months, at the end of which time the wound closed, but the patient continued to suffer pain and besides that had incontinence. When he came to me, fifteen months

after this operation, the prostate and seminal vesicles were normal. The urethroscope showed that both of the sphincters, internal and external, were dilated, that the usual punctiform closure was absent, and in its place transverse slits. There was no urine in the bladder, but although it was constantly empty its capacity was 315 c.c. and its tonicity good. The patient had incontinence of urine, wore a rubber urinal, and suffered very much from pain in the urethra, owing to the constant presence of urine, so that he had acquired the morphine habit and for many months had been taking 40 grains a day. The drug had completely undermined his mental and physical character. I decided to try local treatment; massage of the prostate, dilatation of the urethra, but these made him worse, and as he was suffering greatly I advised an operation. It was evident that in the previous operation both sphincters had been divided, I decided to attempt to restore both of them if possible.

Operation. Suprapubic cystostomy was first performed so as to examine the vesical sphincter. The urethral orifice was found to be gaping and the index finger could be easily inserted. It was quite evident that the sphincter had been divided or ruptured, and that it failed to close the orifice. In order to bring this together it was thought best to excise the mucous membrane in the lower half, thus exposing the muscle beneath. Examination then showed what seemed to be ends of sphincter on each side; these were later caught up with tenaculum forceps and two catgut sutures placed so as to draw the muscles together and produce a well-closed sphincter. In so doing a small artificial median bar was produced. A large mass of scar tissue was found in the perineum; this extended from the cutaneous scar, which was quite broad, to the urethra itself and from the posterior part of the bulb along the membranous urethra to the anterior portion of the prostatic urethra. The median incision through this scar tissue showed no evidence of muscle adjacent to the urethra. A considerable mass was, therefore, excised on each side

along with some urethral mucous membrane which was very redundant and thick. At no place did the urethra come together, as if there were a sphincter surrounding it. This dissection was carried well out on each side until a healthy-looking muscle was reached, it being necessary to go for a distance of about 1 cm. On the left side a definite sphincter-like muscle was found; on the right it was not so definite, being rather longitudinal than circular. Healthy-looking muscle was also obtained on each side well down toward the prostatic orifice. In the region of the membranous urethra a depression was seen along the anterior wall and above this was a rather prominent fold. It was thought best to make an incision here to see whether definite muscle lay beneath, but on examination it seemed evident that the sphincter had been divided or ruptured and that scar tissue had replaced it. This portion of tissue was, therefore, excised and muscle drawn together with sutures of catgut. The wound was then closed with several layers of interrupted catgut sutures, the mucous membrane being drawn together with three sutures at wide intervals and the peri-urethral muscle approximated with numerous sutures of interrupted catgut, particular care being taken in the region of the membranous urethra to obtain good muscle for approximation. Perineal drainage was provided by means of a small catheter which emerged from the anterior angle of the wound in the bulbous urethra. The suprapubic wound was then closed around a large drainage tube. The patient stood the operation well. The convalescence was very satisfactory with the exception of the treatment of the morphine habit. At first the patient required 25 grains of morphine daily. The perineal tube was removed on the tenth day, and after that all of the urine escaped through the suprapubic tube, showing that the sphincters had been restored to action. During the third week the perineal wound healed completely, but the suprapubic drainage tube was not removed until the fifth week. One week later the suprapubic wound was healed, and the

patient voided through the urethra without difficulty or pain, and was able to retain urine for several hours. After that the stream of urine became progressively smaller, and instrumental examination of the urethra showed a stricture at the site of the operation in the membranous urethra. Filiforms were passed with ease, and the urethra was dilated with followers up to 26° F. For four days after this there was slight incontinence, but normal urination was soon established and the patient was able to retain urine for six hours and void freely without pain.

Great difficulty was experienced in curing the patient of the morphine habit. The gradual reduction in the dosage of the drug upset the patient greatly, and at times was accompanied by collapse, nausea, and vomiting. About April 15 the administration of morphine was suddenly cut off; this was followed by very serious illness of the patient, marked prostration with vomiting, but after a week the patient began to improve and no morphine was given for four weeks before the discharge of the patient from the hospital.

May 17, 1907. At that time patient was able to void urine freely without hesitation, difficulty, or pain, and to retain it for six hours. The stricture did not recur, but filiforms and followers were passed on two occasions.

June 13, 1907. Letter. "Two weeks ago, following the grippe, I had considerable difficulty in voiding urine. A physician attempted to pass a sound but without success, owing to an obstruction in the membranous urethra."

June 15, 1907. Examination shows a stricture in the membranous urethra through which a small silver catheter cannot be passed. With filiform and follower it was easily dilated to No. 12 F.

June 25, 1907. Dilators have been passed on three occasions and no difficulty is now experienced in introducing No. 21 F. For four days the patient has been irrigating the bladder by hydraulic pressure. The vesical capacity is 500 c.c.; tonicity is good. Urination is practically normal. Does not have to

void at all during the night. There is no incontinence, no hesitation, and the urinary stream is large. Erections have returned and the sexual desire is as strong as ever. Patient has not taken morphine since April 21, and says that he feels no craving whatever for the drug. His general health has improved remarkably.

November 21, 1907. Letter. "I used a sound occasionally after my return home, but have not been dilated since August 1. I void urine about six times during the day and about once at night. The urinary stream is normal, micturition free and without pain. I have not used any morphine for seven months, and my health is better than it has been for ten years."

Literature. Since this operation I have looked over the literature and have found numerous articles on the treatment of incontinence of urine. They mention internal treatment by various types of drugs, particularly strychnine; local treatment by massage, by electricity, by dilatations, local injections of paraffin and vaseline. Epidural and other forms of spinal injections, with either water or salt solution, have been used. In the female the only operations I have been able to find reported have been torsion of the urethra (somewhat similar to torsion of the rectum, to relieve rectal incontinence), but the reports are unsatisfactory.

In looking into the literature, with regard to the comparative value of the sphincters in control of micturition in general, I find a great mass of conflicting testimony. Some writers think that the external sphincter does the work; others think it is the internal sphincter. Freyer reports autopsies on cases of previous suprapubic prostatectomy in which micturition had been normal, but in which he found the internal sphincter greatly dilated, showing distinctly that it was not necessary for the maintenance of urinary incontinence. On the other hand, after perineal prostatectomy, before the wound heals and while the urine comes out of the urethra back of the external sphincter, the patient is often able to control his urine,

showing that the internal sphincter is also sufficient to prevent incontinence.

I have had one case in which the pelvis was mashed between two freight cars, and the urethra was cut off back of the triangular ligament. The bladder with the prostate was also separated from the membranous urethra by about three inches (a large blood clot intervening). But after I had caught hold of the prostate through the perineum and passed a catheter into the bladder, 2 liters of urine were evacuated. This would seem to indicate that the internal sphincter is sufficient. From these cases it would seem that either sphincter is sufficient to prevent incontinence, yet we know there are a great many cases of incontinence of urine in which one of the sphincters is perfectly intact. A great deal more investigation needs to be done in regard to the sphincters in order to settle their value and to explain the cause of incontinence.

I have reported this case to show the possibilities of surgery in cases of this type. It was a distressing case; the man had suffered a great deal and had incontinence of urine for fifteen months. On account of suffering much pain he developed the morphine habit. He has apparently been absolutely cured by the plastic operation described above, which included both sphincters—internal and external.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore.—I have had a number of cases in which I have attempted to suture the sphincter muscle of the urethra in women. I recall one case following labor, where the neck of the bladder had been crushed between the head and the symphysis. Instead of making the ordinary oval resection of the anterior wall, I cut the anterior wall of the vagina open in a straight line and exposed the neck of the bladder by turning back flaps, after which I sutured the severed ends of the sphincter muscles together, using two fine, silk sutures, and catching the muscle up on either side.

It is easy to demonstrate that this operation of suturing the sphincter muscle can be done. In this particular case the woman had nothing but a thin bladder wall intervening after cutting through the vagina. My first case was seen about ten years ago. In some cases I succeeded, while in others I failed, and I can give no explanation as to why I failed in some instances and was successful in others. I have now given up this operative treatment for paraffin injections which require patience, but in the end give good results.

I am very glad that Dr. Young has taken up this subject and reported this interesting case, and I shall look up my own cases which have not yet been reported.

Dr. Alexander Hugh Ferguson, of Chicago.—I wish to compliment Dr. Young on his paper, on suturing the internal sphincter of the bladder. I naturally hoped that it was in connection with prostatectomy. I overlapped the perineal structures in a patient from whom I removed the prostate two years previously. I split the perineum wide open and overlapped all the structures except the mucous membrane and skin. I took all the structures en masse and overlapped them, using two rows of catgut sutures to keep them in place. The incontinence of urine was relieved and I believe permanently. Four years ago I did a similar operation on a female patient. I operated on her for incontinence by twisting the urethra, and two-thirds of the urethra sloughed. Later I overlapped the remainder of the urethra and the base of the bladder with the exception of the mucous membrane. This woman made a splendid recovery, for about a year, and then some incontinence returned. In a number of other cases, with the urethra intact, the operation has acted beautifully.

In the majority of cases there was retention of urine for several days after the operation. A catheter had to be retained for over a week.

Dr. Young (closing).—With regard to incontinence after prostatectomy, a question which Dr. Ferguson has brought up, I will say, that if the operation is carefully done, that should only be a temporary affair. In about 235 cases of perineal prostatectomy, I have only had three cases of incontinence. Two of these patients have since developed, or had at the time of the operation, locomotor ataxia. In one case I did a little too much to the internal sphincters in removing a stone, and he has incontinence which bothers him when

he is up, but not at night. In practically all of these cases, however, the incontinence is of short duration, and it is generally due to two things, either to doing too much to the internal sphincter, as in cases complicated with calculus, in which I have dilated the urethra to remove the calculus, or in cases in which from bunglesome operating too much traumatism has been inflicted on the membranous urethra in exposing it. I recall one or two cases in which an orderly, in holding a stiff instrument during the operation, has allowed it to slip out of the posterior urethra, puncturing the wall of the urethra, in that way producing traumatism. These cases have had temporary incontinence, but if prostatectomy is carefully done there should not be incontinence.

In most of the reported cases of incontinence, after perineal prostatectomy, a median perineal incision has been made and the prostate removed through the greatly dilated, and probably injured, external sphincter and triangular ligament. It is indeed wonderful that it ever regains its tone after such insult as it receives in such cases. The ideal method would seem to be an intersphincteric removal of the lateral lobes, leaving, if possible, both the internal and external sphincters intact. That this is possible is amply demonstrated by the fact that very many of my patients never have incontinence of urine after the removal of the tube on the day following the operation of conservative prostatectomy. The urine escapes through the open perineal wound, but it is voided at intervals and does not flow out continuously.

THE INCONSISTENCIES OF THE GAUZE PACK.

By Hubert Ashley Royster, M.D.,
Raleigh, N. C.

More and more each year since I began the practice of surgery, there has grown in my mind a conviction that the use of gauze, as ordinarily employed in our work, presents certain marked inconsistencies. I do not wish to be understood as condemning gauze packing in general. I am inclined, however, to doubt whether the introduction of gauze into surgical practice was as much of a blessing as it would appear. Outside of its service as dressing and sponge material, to which no legitimate objection can be offered, gauze is employed in surgery, for (1) draining recent or granulating wounds, and packing sinuses, cavities, etc.; (2) walling off septic matter in performing abdominal operations. It is to these two topics that this paper is addressed.

1. Methods of drainage were in general use before the principles of drainage were well understood. We drained before we knew why we drained. Numerous kinds of drains have been employed. A strip of gauze was simply the means of applying to a wound the well-known law of capillary attraction. It is common experience that gauze frequently fails to drain and tubes of rubber or other material have been long in use, while more recently combinations of rubber and gauze (split tube, and cigarette drains) are being substituted. The call for improvement has come because so seldom is the object of the gauze drain secured. Instead of facilitating the removal of wound products, it acts as a successful stopper to the outlet and impedes their natural outflow.

The one thing to be desired in all drainage is the patency of the wound orifice, in order that the objectionable contents may escape. Whatever prevents this escape, either by clogging the cavity or by obstructing the opening, must be undesirable. Herein lies the chief indictment against the gauze drain, for both offences can be laid at its door. Not all the trouble, however, is due to the gauze; much of the mischief is done by the surgeon. As usually employed there could be no more efficient plug than the stereotyped gauze packing which is placed in a wound. Purulent discharges are not drained, but the gauze becomes soaked with them and the wound drains better when the packing is removed. In the instances in which the gauze pack is applied to arrest hemorrhage, the end to be attained is just the opposite of drainage, and the gauze should be put in as tightly as possible. To express it tersely, when intended for a drain, gauze should be inserted after the manner of a lamp-wick; when used for hemorrhage it should be packed in like wadding with a ramrod.

The edges of a wound from which an unprotected, tightly fitting gauze tape is protruding begin to contract around it and become adherent to it in a few hours. Unless the secretion be of very thin consistence, no capillarity will be present, and thus discharges, which would easily be evacuated, are held in by the very means employed for their removal. In shorter terms, a tight drain is worse than none.

To those who have seen the light and who are now using rubber tissue or tubes (and often no drain at all where formerly they thought it indispensable), this arraignment of gauze may seem superfluous, but I am convinced that many surgeons do not yet appreciate the plain principles here involved. There is a field for the use of gauze in packing sinuses, fistulæ and granulating wounds, so that healing may take place slowly from the bottom. Even here, however, the packing should be loosely done and the gauze preferably saturated with some subtsance which will prevent sealing of the wound

edges. But it is as a drain that the disadvantages of gauze constantly force themselves upon us. While some of us are probably not draining any more or less frequently, we are draining more judiciously and with clearer conceptions of why we drain. An eminent American surgeon said recently, as he left a large wound open and packed it with gauze: "If I drain, this patient is sure to get well; if I close up, he may possibly die; therefore, I drain." Now, as far as my knowledge goes, I am not sure that I ever saved or lost a patient because I did or did not use a gauze drain. Apparently the matter is not always susceptible of proof on either side. Some will persist in the use of gauze drains and, in the event of disaster, console themselves by believing that it is better to have drained and lost than never to have drained at all. There are drains that do not drain, and those who get good results with them are merely proving that no drainage was needed.

There is no controversy as to the object in view in the treatment of open wounds. If the surgeon be sure that the wound unaided will free itself satisfactorily from all deleterious fluids, he will insert no drain—and it is well. If, on the other hand, the surgeon be sure that the wound needs assistance, he will resort to artificial drainage—and it is well. Success follows both modes of treatment, and to some it may seem that it makes no difference whether we drain or do not drain; but surely to none can it seem a matter of indifference to employ or not to employ, for the purpose of drainage, a material like gauze tightly packed into a wound. It would appear, further, that all must recognize the importance of settling definitely the question whether a strip of gauze inserted loosely as a wick will continue to drain efficiently after it becomes saturated with pus, or whether it will then cease to drain, thereby necessarily interfering with the natural discharge of fluids from the wound.

2. When we come to consider the use of gauze to wall off septic matter while operating within the abdomen, we

approach a question which vitally concerns the work of every surgeon. I realize that I shall call attention to some matters not heretofore discussed and say some things which may be productive of much argument, and, perhaps, refutation of my opinions. My criticisms of the method in vogue are derived entirely from observation of the work of others. For my own part I have never fallen into the routine way of packing off with gauze in the abdominal cavity. There always seemed to me some well-founded objections to it, and, as my mortality did not seem to be affected by omitting it, I continued to do without it. But I believe that the majority of operators are in the habit of placing large pads or even huge rolls of gauze in the abdomen after making the incision in pus cases or suspected ones. This is done in order that there may be a protecting wall around the purulent area to ward off infection from the clean portions. To accomplish this there must be a long incision, the viscera are subjected to unnecessary manipulation, and very likely the uninfected regions will be constantly in contact with pus-soaked gauze. Capillarity exerts its influence also here as elsewhere, and, when one end of a gauze pad is in contact with purulent discharge, the whole piece will become soaked and the other end soiled, if sufficient time is allowed.

A glance at the accepted plan of introducing the gauze for walling off will indicate its inconsistencies and even its dangers. At least it may not be difficult to show its uselessness. When a free suppuration is present in the abdomen, the septic material will generally be seen at the incision as soon as the cavity is opened, and if an attempt is made to pack it off with gauze (though all the pus possible be first sponged away), the only sure thing done is the carrying of infectious products by means of the gauze to distant clean areas, there to remain during the operation as an added source of danger. In the case of an abscess already localized by nature, if the gauze might seem to be of use, it is when the shielding wall is, for some reason, intentionally broken through; but here it is

open to the same objections as have just been mentioned. The truth is, exposure of peritoneum to gauze saturated with pus is just as pregnant with danger as the presence of pus itself among the intestines. Besides, the gauze pack, as a foreign body, interferes with the normal resisting power of the peritoneum. The superior tolerance of this membrane for infection and traumatism explains why the mortality in abdominal surgery is not greater, particularly when the pack is used. Certainly every opportunity is afforded to extend infection by pushing rolls of gauze through collections of pus into healthy parts or by packing around abscesses with an artificial wall of gauze which becomes steeped in septic matter, and, finally, a glaring inconsistency is seen in the removal of the packs with already contaminated hands and in the unavoidable rolling upward of intestinal coils against the purulent area.

Perhaps someone will say that these observations appear to be just, but that the conditions as described do not exist. That may be true of individual surgeons, but is it not probable that these things are being done over and over without a thought as to whether they are necessary or harmful? And is it not evident that many of those, who believe they are walling off, are not doing so? Someone again may ask, if these objections against the gauze pack are to be sustained, what method shall we employ? It is not the purpose of this paper to provide ways and means. It might be suggested, however, that the gentle art of sponging will take care of the visible pus, and that what lurks behind had better stay where it is and be permitted to escape later than to be carried to parts we know not of. By all means let us resolve (1) that we will employ gauze sensibly if we can, and not at all if we cannot; (2) that if the using of gauze maketh our technique to offend, we will use no more gauze while the world standeth.

DISCUSSION.

Dr. Robert T. Morris, of New York City.—Some time ago, at a medical meeting, a rather timid speaker addressed the audience as "members of the medical procession." (Laughter.) Now, Dr. Royster is leading the medical procession in this matter of gauze. Just think of the inconsistency of stopping hemorrhage with gauze packing, and draining septic fluid at the same time. Blowing hot and blowing cold simultaneously. The American, with his sense of humor, ought to have recognized this some time ago. It has a humorous rather than a scientific side. As to the matter of walling off a septic area from an area that is not infected, that is a subject for discussion. We do not need to wall off these areas at all. When there is pus in the peritoneal cavity, you can spread it all over the normal peritoneum as far as you please, and it will only give nourishment from the albumin in the fluid. Never mind pus getting on to the normal peritoneum. Do not make a large hole. Do not commit taxidermy on any patient. Do not pack gauze in for the purpose of walling in pus, as you damage the patient's endothelium. It is the mechanical idea of cleanliness which appeals to most surgeons, but that is out of date. Where you have pus in the peritoneal cavity, with leukocytosis and phagocytosis established, you can spread it all you please. You need not mind that pus.

As to sponging, I do not believe you need to do that. I am much opposed to sponging away pus in these cases, as you injure the endothelium on which the patient is depending for his life.

The use of gauze for closing fistulas is also open for discussion. Once upon a time I thought it was necessary to keep open a fecal fistula, after an appendix operation, with gauze, and I remember once in the springtime I had three cases of fecal fistula that I had packed with gauze. I received a telegram from a friend that there was a good run of salmon, and I went off to fish, and when I returned the fistulæ were all closed. If I had kept on packing these fistulæ with gauze they would have remained wide open all summer, because gauze will enmesh new granulations; new tissue is caught in the gauze, and when you take it out it removes the granulation material that is thrown out by Nature for the purpose of repair. In

other words, you remove the repair cells with the gauze. The repair of a wound is aided by the hyperplastic tissue which Nature deposits and which is necessary, and if you do not use gauze this material is not interfered with.

Dr. I. S. Stone, of Washington, D. C.—I have enjoyed Dr. Royster's paper very much. I appreciate it and endorse it almost entirely.

I feel considerable hesitancy in speaking after that great anti-"taxidermist"—Morris. But if Dr. Morris has done any one thing more than another for which he deserves great credit, it is the restriction which he has placed upon the use of gauze. There are a few cases in which gauze may be used. First, let us take the Wertheim operation where we remove the uterus making a wide dissection. The majority of operators would use gauze in such cases to suppress hemorrhages. I do not think they ought to insist on the use of gauze in preventing the intestines from coming down in that area. Until last year I used gauze in such cases, but now I believe it was not necessary. I have had smooth recoveries from the use of simple, rubber-tube drainage.

With regard to operations for the removal of appendices, I do not think it is necessary to drain with gauze in all such cases. Posterior drainage will answer the purpose in nearly every case in which there is retroperitoneal infection. In this connection I recall my experience with Professor Kehr while in Halberstadt. I learned something from him with regard to the treatment of gallstone disease, and especially hepatic duct cases as well as acute pancreatic cases. I remember seeing one patient walking around with a considerable quantity of gauze which had been packed about the pancreas so that it required almost a daily surgical operation in the doctor's dressing-room to remove it. These wounds were opened until we could almost see the pancreas down through the opening in the abdominal wall. Gauze has "cofferdam" effect in these pancreatic cases, but it seems to me that one rarely needs to use any such method of treatment. I saw one case of hemorrhagic pancreatitis successfully treated with the aid of gauze packing. I do not think there is anything that can take the place of it in such instances.

Dr. Edward H. Ochsner, of Chicago.—With reference to the packing of fistula with gauze, I would say that I never saw a fistula of long standing which has been improved by

repeated packing, and I believe that all of the cases will eventually get well without packing, providing none of the following conditions exist to prevent healing, and if these do exist the packing will not hasten the recovery. The three conditions referred to are: (1) The existence of a foreign body in the fistula such as sequestra, unabsorbed stitches, etc.; (2) an obstruction distal to the fistula, such as a stricture of the urethra distal to a perineal fistula; and (3) the presence of actinomycosis, blastomycosis, or tuberculosis with mixed infection.

Dr. R. M. Cunningham, of Ensley, Ala.—Dr. Royster has given us an excellent paper, but I fear he was a little too dogmatic in some particulars. Consistency is a jewel, but very frequently the same thing can be applied differently, thereby obtaining results which would by no means show the method to be inconsistent. There is a great deal of difference in the use of a maximum amount of gauze packing to stop hemorrhage, and the use of loose gauze for the purpose of draining the surplus blood or pus from a wound. And it is to that aspect that I desire to make a few remarks, and the best way to illustrate what I have to say is to report some cases.

A man in falling fell on a large nail which entered the outer aspect of the thigh at the junction of the middle and lower third, producing a compound fracture of the bone and a penetrating wound. The patient refused exploration. The limb was prepared just as if it were going to be amputated. A loose piece of gauze was carried down to the bone with a sterilized probe and allowed to remain for twenty-four hours. The gauze all around the limb was saturated with blood. It was impossible to disinfect the wound from the outside with antiseptics; Nature did it with hemorrhages, and the gauze carried it away. There was a compound fracture of the elbow, that is, a dislocation fracture of the external condyle. The skin and soft parts were contused. The patient refused incision. There was thorough cleansing of the parts as if we were going to amputate or resect the elbow-joint. A piece of gauze was carried down to the joint, which was greatly saturated all around with the hemorrhage. There was no reaction. The gauze was removed at the end of twenty-four hours, with primary union following and the patient doing well. I could cite many similar instances. I prefer, as a matter of routine, drainage by means of catgut, horse-hair, or fine silkworm gut.

In regard to pus cases I cannot see any difference in a spontaneous rupture of an appendiceal abscess with general peritonitis immediately following, and a rupture that is caused by the surgeon's finger without protection of the general peritoneal cavity. I could not rest easy after making an operation for an abscess, caused from a ruptured appendix, without walling off the intestines with a piece of gauze, because by the time the gauze is saturated we have adhesions, and the peritoneal cavity is shut off. Certainly the mechanical effects of the gauze would prevent the migration of the pus to different parts of the abdomen. I do not believe that Dr. Morris will enunciate the doctrine that pus from these abscesses, escaping into different parts of the peritoneal cavity, is innocuous. If that is the case, Why operate for appendiceal abscesses? Why not trust to Nature? Perhaps they will be discharged into the rectum, or if they are discharged into the peritoneal cavity Nature will take care of the pus. In a great many of these cases of appendiceal abscesses the abscess is a simple affair; one that we can easily reach and deal with without using gauze. Of course there is no use to pack that, but considering the little observation I have had some cases showed some healthy gut between the abscess and abdominal wall, so, at any rate, it is difficult to get into the abscess without exposing the peritoneal cavity. I shall continue to pack before I open abscesses, and then, I think, gauze may be inserted and left temporarily until adhesions shall have occurred, and then remove it. I take it for granted that the essayist did not have reference to the capillary gauze packing to keep pus from going through into the abdomen, but had reference to the gauze that is left as a part of the dressing. I believe gauze has its place when properly used, and we cannot get along without it.

Dr. George S. Brown, of Birmingham, Ala.—I think the essayist put unnecessary emphasis on the use of gauze as applied in some cases. Surgeons generally do not now use gauze packing because they fear contamination, but merely for a dam. I think most of us have learned that contamination does not necessarily mean infection of the healthy peritoneum; but it is hard as well as unnecessary to do without gauze in some cases where it is used to hold back the intestines. In some operations in the pelvis and on the common duct, we can hardly do without gauze packing. I fully agree with the

essayist in saying that a wound should not be packed in the effort to drain it. Most surgeons have come to see now that gauze packing does not drain, and a drain does not pack.

Dr. Charles M. Rosser, of Dallas, Texas.—Dr. Royster has stated his position forcibly, but to me not convincingly. Dr. Morris surprises me by apparently ignoring his own teaching that there is in all cases a maximum dose of infection, and that safety lies short of that. I agree that gauze pack, which unduly traumatizes, should be avoided, and understand that when operating, in the presence of pus, care should be taken not to disturb the pathological barrier with which Nature is coating surfaces of all serious surfaces. But we should also remember that very few operations are safely performed under cover, and that fat and skin, supplied as they are with absorbing lymphatics, furnish the most dreaded avenues, and that there is no such protection.

We must neither eviscerate a patient nor trust assistants to mechanically handle abdominal structures, and in my judgment a carefully adjusted moist gauze pack will better remove from the operative area, and will be the best protection to wound edges.

Dr. Royster (closing).—I expected my paper to get discussed and myself to be "cussed," and my predictions have come true. In the first place I want to say that I have been taken a little too seriously. I did not condemn gauze packing or the use of gauze in the abdomen. I condemned it as it is used by a great many surgeons. We use it because we have been taught to use it, and, like the ostrich, we bury our heads in the sand and think it is necessary to go on using it.

In regard to Dr. Morris' suggestion about sponging, I referred in my paper to what I call the gentle art of sponging. I believe in sponging carefully the infected area, but am likewise careful not to touch or sponge the uninfected area.

With regard to the remarks made by Dr. Ochsner as to the treatment of fistulæ, I wish to say that I am here and now converted to his skepticism in regard to the use of gauze, and I hope I shall not use it again in packing a fistula.

Dr. Stone expressed the sentiments I thought he would. When he spoke of the Kehr incision, I was thinking that one might as well remove the whole front of the belly wall and look in, because you can practically see and handle all of the organs of the abdomen through a Kehr incision.

Dr. Cunningham's remarks were well chosen, but I thought I pointed out the difference between using gauze for checking hemorrhage and its use as a drain. There is one thing I would say to him, however, and that is, it is best not to disturb Nature, but to imitate her. Did you ever hear of a sudden death from appendicitis? Deaths are caused by doing too much to the peritoneum in these cases, so that there is absorption of infective material. Gauze is unnecessary, but not very harmful when it is used sensibly, and that is the reason he gets good results. He uses gauze, "Not wisely, but too well."

Dr. Rosser is very dubious as to the position I have seemed to take. When one uses gauze in his surgical work, it means taking too long to operate. If you put in gauze and take it out, it consumes more time than by not using it, and that has much to do with the operation.

CYST OF THE PANCREAS, WITH REPORT OF AN OPERATION AND EXHIBITION OF THE SPECIMEN.

By Rufus B. Hall, M.D.,
Cincinnati.

In the literature cysts of the pancreas are described as true cysts and pseudocysts.

It is necessary in discussing this subject to recall the facts that a true cyst of the pancreas is a sacculated accumulation of fluid originating in the pancreas and retaining an anatomical connection with the organ, and a pseudocyst is an accumulation of fluid in the lesser peritoneal cavity about the pancreas. It is evident that the treatment of the two conditions could not always be carried out with the same surgical technique. True cysts of the pancreas are retroperitoneal tumors; pseudocysts are intraperitoneal accumulation of fluid. The cause and the mode of development of true cysts is somewhat in doubt. While there may be cases of dilatation of the duct by obstruction from calculi, it would be difficult to prove the exact cause, except upon autopsy. That inflammation or traumatism play an important role in the production of true cysts, there can be but little doubt.

Judging from the literature one would be inclined to believe that the tail of the pancreas is the favorite anatomical location for the development of these cysts. In the inflammatory process, effusion takes place into the glandular tissue of the organ, which results in degenerative changes, leading to the formation of an adventitious wall of an inflammatory material

plus the artified pancreatic tissue, thus forming the true sac into which hemorrhages repeatedly occur. Such tumors are distinguished by their dark color, hemorrhagic contents, and anatomical connection with the organ. The contents of pancreatic cysts are varied, but usually the fluid is of a brownish-red or dark-green color. They are alkaline in reaction and contain albumin, fat globules, crystals of cholesterin, and white and red corpuscles.

The fluid from the cysts quickly excites irritation. The size of pancreatic cysts varies from a small vesicle to an immense sac containing three or four gallons. The diagnosis of pancreatic cysts should be based upon the character of the contents of the tumor rather than upon the supposed demonstration of anatomical connection. The mere finding of the remains of the pancreas by the examining finger from within the abdomen is not positive proof that the sac is of pancreatic origin. It is a well-recognized fact that tumors within the abdomen often misplace neighboring organs or become attached to them, thus misleading the surgeon in his judgment. But, if the contents of a cyst demonstrates the presence of pancreatic fluid and the anatomical relations are those of a pancreatic cyst, little doubt should remain as to its true nature. These cysts, if they develop to any great size, may displace neighboring organs.

Salzer refers to one instance in which the cyst developed behind the abdominal aorta and vena cava, pushing these vessels forward toward the abdominal wall. In the author's case, fortunately those important structures were behind the cyst, yet they were firmly attached to it. The cyst wall is prone to undergo degenerate changes from pressure necrosis, permitting the escape of its contents into the peritoneal cavity, or by fistulous communication into the alimentary canal.

In a large percentage of the cases there is a history more or less definite of an abdominal injury. In many cases the enlargement is observed soon after the injury; others, in

years have elapsed. In other instances the development of the cyst follows some acute diseases like typhoid fever, attacks of colic, or intestinal disturbances, while in a large majority the course of pancreatic cysts is comparatively acute for a few weeks covering the entire history; but there are many instances on record in which the cyst has been known to be present for years without causing much inconvenience until some accidental hemorrhage, or rupture of the sac, or the pressure causing intestinal obstruction brings the case to a sudden termination.

The subject of this report is Mrs. G. W. S., of Mason, Ohio, aged forty-two years; mother of eleven children.

In November, 1897, she was delivered by Dr. Claton Hall. He discovered at that time that she had an abdominal tumor about the size of an ordinary cocoanut, which was not tender upon pressure. She was a strong and vigorous woman, a farmer's wife, and had never needed the services of a physician excepting at confinement, which had always been normal like the one at this time. The doctor only discovered the tumor in delivering the placenta. He regarded it as ovarian, but he could not explain why it was not movable. It remained above the uterus after her delivery. He advised her and her husband to have the tumor removed as soon as she was convalescent, but in the place of having a normal convalescence, as she had been accustomed to having at her previous confinements, within a day or two she developed fever. Her temperature ran from 100° to 102° for three or four weeks, and she was not able to leave her bed for four weeks after her delivery, but within two or three weeks after this time she was in her normal condition and felt so well and so little inconvenienced from the presence of the tumor that she declined an operation for its removal.

Dr. Hall conferred with the writer two or three times about the management of the case during her illness. Within two years after this delivery she gave birth to another child, with almost exactly the same clinical history following it; that is,

fever came on in two or three days and continued three or four weeks. There was no indication that there was any infection in the uterus. There was no unusual discharge, but the abdomen was largely distended by gas. The patient was again advised to have the tumor removed, and said she would do so as soon as she recovered. At the end of four or five weeks she was again able to leave her room, and within a month or so was apparently perfectly well, excepting the presence of the tumor.

During the period from November, 1897, to January, 1906, she bore four children and had two premature births at about four and one-half months. Each one of the living children was followed by the same acute illness following delivery described above. In both premature labors she missed having any complications following delivery. The tumor steadily enlarged from the time it was first observed until her last delivery on August 10, 1906, at which time the tumor appeared to be about one and one-half times the size of an adult head. In the first three deliveries she was attended by Dr. Hall. After his death Dr. D. B. Hamilton, of Mason, Ohio, was her physician and referred the patient to me. The last delivery was followed within twenty-four hours by a severe pain in the region of the tumor, the temperature reaching to 102° and 105°. This illness continued with fluctuating temperature, and she and her husband believed that it would disappear like the preceding attacks, and declined to have an operation made. At the time of her delivery her estimated weight was 180 pounds, which was her usual weight for several years. She grew steadily worse, and within a couple of weeks after her delivery she commenced to have chills at irregular times, followed by high temperature, sweats, and diarrhea. She would not consent to the operation and did not consent to one until January 8, 1907. She had been confined to her bed since her delivery on August 10, 1906. She was brought to the hospital on a stretcher January 8, 1907. Her estimated weight was seventy-five or eighty pounds; her

pulse rate was 136 to 150, and her temperature varied from normal and subnormal to 105° and 106°. She had irregular chills, one or more every twenty-four hours, followed by profuse perspiration and almost collapse. She was very sallow and pale, apparently almost bloodless. She had been unable to take any food excepting liquids for several weeks, and she could retain the liquids only when her temperature was down below 100°. She vomited frequently at other times. There would be an interval of three or four hours each twenty-four hours when she would take liquid nourishment.

During the time of the high temperature she was listless, incoherent, and dazed. Her condition was so very desperate that it looked as if she would die within twenty-four hours at any time up to the time of her operation, which was made January 23, 1907. There were present and assisting, Dr. Joseph A. Hall, Dr. L. S. Colter, of Cincinnati, and Dr. D. B. Hamilton, of Mason, Ohio.

When she entered the hospital examination revealed a tumor in her abdomen apparently the size of a seven-months' gestation. It was dull over the whole front of the abdomen; it extended from the pubic arch to four inches above the umbilicus; both flanks were resonant. Vaginal examinations revealed that the uterus was retroverted and the tumor did not occupy the pelvis. Fluctuation was distinct over the entire tumor. It was evident the cause of her sepsis was in the tumor itself. What the pathology was was not so clear, but the opinion of the writer was that if any operation was made to relieve the patient the tumor would be in such a pathological state that simple draining would not relieve her, and that we must be ready to take the tumor out if we gave her any chance to recover. At this stage I believed that the tumor was ovarian and that she had infection in the tumor from some cause.

When the operation was made the incision was made four inches long, commencing one inch below the umbilicus and

extending downward. I found, what I hoped to find, that the entire tumor was adherent to the abdominal wall without making any attempt to separate it more than to be convinced of this fact. The cyst wall was a dark chocolate color, looking almost the color of liver tissue. It was tapped with a large-sized Tait trocar, and about one and one-half gallons of fluid of a dark chocolate color evacuated, which had a foul-smelling odor similar to that of an ischiorectal abscess. I believe the infection of the contents of the cyst was conveyed by the intestinal track. Upon examination of the fluid it was alkaline in reaction and contained pus, crystals of cholesterin, blood corpuscles, and fat globules, and a great amount of debris. I am convinced that there was an effort on the part of Nature to establish a communication with the intestinal track, and thus empty the contents of the cyst in that manner.

After the cyst was emptied it contracted greatly. The adhesions to the abdominal wall were separated, and it was at once determined that it was in no way connected with the uterus or ovaries. They were perfectly normal and were not adherent to the tumor. By sticking close to the tumor itself, we could enucleate it without great difficulty at the first part of the operation. The greatest difficulty appeared to be breaking through the tumor wall, on account of its friability, and fouling the field of operation, which was done on several occasions. The cyst wall was apparently dead and macerated, and varied greatly in thickness. As you will observe it is about five-eighths of an inch thick, excepting in numerous points there are places about the size of a quarter of a dollar that are very much thinner than the adjacent part. All of these thin places were very much more friable than elsewhere. It was in these thin parts that we easily tore through the wall of the sac in enucleating it. The bleeding was not very severe until we approached the back part of the tumor in the upper half of the abdomen. Here we separated some vessels that caused us considerable anxiety for a short time. We were able to soon control the bleeding and enucleate the tumor, which was

attached well up toward the left costal cartilage, about two and one-half inches from the spinal column. The pedicle was as thick as the finger. After ligation, in place of dividing it with the scissors, I was able to pinch it off with my fingers, showing the friability of the cyst wall. It was found after we had enucleated the tumor that the colon as well as the small intestines were in front and that the tumor had been enucleated from the postperitoneal cavity.

The patient suffered a profound shock and rallied very slowly. Convalescence was not established until the fourth day. She had a tedious and protracted convalescence. The sinus did not close for five weeks after the operation. The patient left the hospital six weeks after the operation convalescent, but quite feeble. She continued to improve and after three or four months she had regained her usual health, and is now enjoying most excellent health.

The anatomical location of the tumor, its relation to the surrounding organs, and the character of its contents can leave no possible doubt that we had to deal with the true cyst of the pancreas due to some obstruction of the duct in that organ. The case is unusual in having a long history of a well-defined tumor with comparatively little inconvenience excepting following her confinements. Whether or not those attacks were due to some local inflammation about the capsule of the tumor, or some infection about the uterus, is uncertain, but judging from her last attack coming on immediately after confinement, simulating the other attacks, one would be inclined to the opinion that the former attacks of pain and fever were due to inflammation about the cyst wall. The last attack probably commenced as the former attacks of inflammation of the cyst wall, but later in the progress of this attack infection of the contents of the tumor was conveyed by the intestinal track, and this infection was the cause of her sepsis.

DISCUSSION.

Dr. Henry T. Byford, of Chicago.—I am sorry that I did not get here in time to hear the beginning of Dr. Hall's paper. I would like to ask him whether he knew or supposed he was removing with this cyst the pancreas itself, or the atrophic glands, or whether he left the pancreas?

Dr. Howard A. Kelly, of Baltimore.—My experience with cysts of the pancreas has been limited, but I will briefly mention one case of cyst of the pancreas that came under my observation about ten years ago, in which I simply opened and drained, as the condition of the patient and the technical difficulties of removal justified no more extensive procedure. About two years ago I was called in consultation to see the same woman and found that she had carcinoma of the pancreas, from which she subsequently died. The cancer probably started in the cyst, but it may have developed from some other part of the pancreas as an independent disease. The possibility of cysts of the pancreas being cancerous or of benign cysts developing into cancer, must have an important place in considering the significance of these tumors and in developing an adequate line of treatment. It is, of course, evident that mere drainage cannot cure cases of this kind.

Dr. James A. Goggans, of Alexander City, Ala.—In 1891 I had a case similar to the one that has been cited by Dr. Hall. In this case I simply stitched and drained, and the patient recovered.

I want to say a word or two relative to the difficulties attending the diagnosis of disease of the pancreas. I have had occasion to operate on several cases since then, but some of them, however, were not cysts of the pancreas. One of them was a case of cystadenoma as large as my fist. I had the specimen examined by the professor of pathology in the University of Michigan, who reported that the cyst sprang from the pancreatic ducts, and that it was a true cystadenoma of the pancreas. I did not make a diagnosis in that case, to my satisfaction, before doing the operation. I removed the growth from above the stomach and left a bleeding cavity in the head of the pancreas, which I stitched up with catgut in order to control the hemorrhage.

Another case which I desire to refer to emphasizes the

difficulties attending the diagnosis of pancreatic disease. This was a man, aged forty-five years, who had symptoms for two years. He sought consultation in Alabama and in other places, and consulted Dr. Janeway, in New York, but not one of his consultants succeeded in making a diagnosis of the nature of the trouble. I advised in this case an exploratory incision, which was consented to and made, and the case proved to be one of cancer of the head of the pancreas. I removed a large part of it, but the patient finally succumbed to the disease six months later. In this case I likewise closed a bleeding chasm in the pancreas; inserted a drain under the stomach which was removed the third day. The abdominal wound healed nicely and he became able to visit in Tennessee and North Carolina before the growth began to give further trouble.

Dr. Mack Rogers, of Birmingham, Ala.—Pathological conditions of the pancreas are so infrequently recognized that I think this paper is worthy of our careful consideration.

We have recently had the report of a successful operation in our city of a cyst of the pancreas that was unrecognized prior to the operation. In this case there were two cysts: one about the size of the ordinary fetal head, and the other about the size of a goose egg. The operator went in through the gastro-hepatic ligament and attacked it by that route. The operation was a success, in that the patient got well. I feel constrained to report this case, inasmuch as these cases are very rare. We have been told that where the pancreatic fluid is permitted to get into the peritoneal cavity, it plays havoc and produces a serious condition. That has been demonstrated in the cases of gunshot injuries that have come into our hospital, the patients having died as a result of having had pancreatic secretion extravasated into the general cavity.

Dr. Hall (closing).—In answer to Dr. Byford I am inclined to think that this was a cyst of the tail of the pancreas. The literature tells us that that is the most favorite anatomical location for cysts, and after the cyst was enucleated I could feel what appeared to me to be a portion of the pancreas left behind. Whether there was a lump or inflammatory mass which made up the head of the pancreas or not, I do not know. The patient was in extremis, and you may well imagine that I did not spend much time in determining whether she had the pancreas remaining or not. The reason, in my opinion,

that this cyst could be enucleated without any great hemorrhage was the condition of the cyst wall itself. The patient had infection of the contents of the cyst from her intestinal tract. The cyst wall had become necrosed; it was almost black. It was so adherent that it simulated a twisted pedicle of an ovarian cyst, with hemorrhage into it. It had almost exactly that appearance; yet when I removed it I did not have any hemorrhage until I ruptured some of the vessels on the back part of the cyst high up. My belief is that it was a cyst of the tail of the pancreas due to obstruction of the duct from some inflammatory process, with a retention cyst, and that the retention cyst became infected through her intestinal tract.

THE MANAGEMENT OF LABOR IN MINOR DEGREES OF PELVIC CONTRACTION:

WITH SPECIAL REFERENCE TO THE RELATIVE INDICATIONS FOR ABDOMINAL CESAREAN SECTION. A TABULATED REPORT OF EIGHTEEN CESAREAN SECTIONS.

By Henry D. Fry, M.D.,
Washington, D. C.

For a long time the maternal mortality of Cesarean section was so high that the operation was considered one of last resort. The death rate ran from 50 to 60 per cent., and Budin made the statement that not a single successful operation was performed in Paris from 1787 to 1876.

Harris published statistics of the results in this country which discouraged anyone from being bold enough to undertake the operation, and reported 11 operations in New York with 10 deaths.

The improved technique inaugurated by Sanger twenty-years ago placed the operation on a different footing. Under the new conditions that have since obtained, the borderline between absolute and relative indications has been changed and increased about 2 cm. In 1901, Williams, of Baltimore, read a paper before the American Gynecological Society advocating that the absolute indications be changed from 5 to 7 cm. in the justominor pelvis, and from 5.5 to 7.5 cm. in the simple flat pelvis. This proposition has been endorsed by Webster, Jewett, and Edgar. Dorland and Hirst make it 6.5 cm.; Peterson, 6.2 cm. Edgar makes a distinction

between the presence of a living and a dead infant, the absolute indications being 7.6 cm. and 6.3 cm., respectively. The relative indications run from these minimal diameters up to 8.5 cm. in the simple flat, and 9 cm. in the justominor pelvis. Above these measurements it is generally conceded that a living infant can be extracted through the natural passages.

The importance is recognized by all operators of early surgical interference before the woman has gone through the exhaustion of prolonged labor pains, and particularly before employing forceps and manipulations that may produce infection.

At the last meeting of the American Gynecological Society, Reynolds, of Boston, read a valuable paper and classed Cesarean sections as primary, secondary, and late. The primary included cases operated upon just in advance of the time of expected labor; the secondary, those performed after a few hours of labor; and the late, those performed after labor had been allowed to go on for some time and when it had been clearly demonstrated that the natural forces could not overcome the obstruction at the pelvic inlet. He reported 289 operations during the past ten years by twenty different operators. The mortality in the first class was 1 death in 82 cases (1.2 per cent.); in the second, 158 cases with 6 deaths (4 per cent.); and in the third, 49 late sections with 6 deaths (12 per cent.). The death rate was clearly proportionate to the duration of labor endured by the woman before operation.

Some obstetricians object to elective Cesarean section because they fear defective drainage through the undilated cervix will give rise to infection. On that account they prefer to let the first stage progress far enough to open the cervical canal. All agree, however, on one point, and that is: Not to let the labor progress until the woman is exhausted or infected. A high mortality and discredit to the operation are the results of its performance under opposite conditions.

To see the cases early, to recognize the possible necessity for Cesarean section, and to conduct the labor accordingly

is the great need of modern obstetric surgery. A large proportion of obstetrical work falls into the hands of the general practitioner, and it behooves him to rise to the occasion and to recognize early the cases of disproportion between the infant's head and the maternal pelvis. Too often he fails to do this until the situation is forced upon him by a long and exhaustive second stage, or, still worse, after the injudicious and fruitless use of forceps. The life of the infant is then seriously jeopardized and the time for a successful Cesarean section is passed. The general practitioner is now more familiar with the symptoms of ectopic pregnancy, and his prompt diagnosis saves many lives; he should be equally wide awake to recognize pelvic deformity.

1. He should be taught the frequency of the existence of pelvic deformity, and the importance of pelvimetry.

2. He should make it a rule of practice to examine all pregnant cases by palpation and pelvimetry in the last month of pregnancy.

It is the common belief that pelvic deformity is of infrequent occurrence. This is because the condition is overlooked. It is like the doctor who says he has been practising obstetrics twenty years and never saw a lacerated perineum. He has never looked for it. Edgar says pelvic contraction is often found in women who frequent dispensaries and hospitals. It is true that it is more commonly found in this class, but the complication is not rare in the higher social scale. Modern social life tends to degeneration of the child-bearing functions. Dysmenorrhea, sterility, undeveloped generative organs, mammary glands, and pelves are the evidences of ill equipment. The generative organs are the last to develop in the growing girl, and, unfortunately, the period of maturity coincides with the period of greatest nervous and physical strain. At this critical time the allurements of society entice the young girl prematurely within its toils. Williams estimates that every fourteenth white, and every sixth colored woman, in Baltimore, has a contracted pelvis. By far the

most common types of deformity are the generally contracted and the simple flat pelvis. The relative frequency of these two types depends largely upon the class of women among whom one works.

Jewett says the simple flat pelvis is a common variety in Europe, but rare in America. Grandin and Jarman, on the other hand, state that the flattened pelvis is a type frequently found, while the justominor is of infrequent occurrence. My own observations made in Washington agree with those of Williams, Edgar, and Hirst, that the justominor is the prevailing type of deformity. Williams found it in one-third of all the contracted pelves occurring in the white, and in two-thirds of those in the black women. Hirst says the justominor pelvis is certainly as common in Philadelphia as the simple flat pelvis, and if one judged from hospital patients, among whom there is a large proportion of shop and factory girls, this variety of contracted pelvis would be regarded as the commonest. Dorland entertains the same views. Obstetricians living in the Southern States of this country where there is a large negro population, find the generally contracted pelvis largely in preponderance.

Investigation by Dr. Edgar Snowden of the records of the Columbia Hospital gives the following results in 532 cases (white 131 colored 401):

	Approximate per cent.
White, all the external pelvic diameters normal	53
Colored, all the external pelvic diameters normal	45
White, all the external pelvic diameters above normal	3
Colored, all the external pelvic diameters above normal	0
White, all the external pelvic diameters diminished	25
Colored, all the external pelvic diameters diminished	49
White, simple flat pelvis	20
Colored, simple flat pelvis	5

According to these figures the measurements indicating the simple flat type of pelvis occurred in 20 per cent. of the white, and in only 5 per cent. of the colored women, while those pointing to the existence of a generally contracted

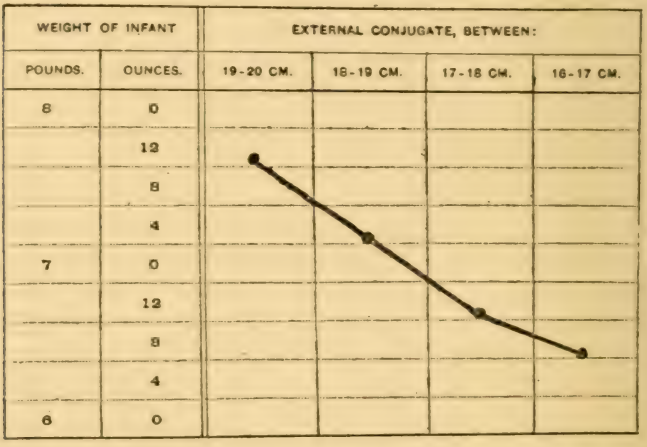
pelvis occurred nearly twice as often in the colored women, being 49 per cent. and 25 per cent., respectively. It is not claimed that all of these women had simple flat and justo-minor pelves. The external conjugate measured less than 20 cm. in all; in some it was as low as 15 cm., and the other external diameters were correspondingly reduced. Owing to the varying thickness of the sacrum the length of the external conjugate is not a reliable index of the length of the internal. A few centimeters, more or less, may not indicate anything. It is usually stated that when the external conjugate measures between 19 cm. and 18 cm., the true conjugate will be shortened in 50 per cent. of the cases, and when below 17 cm. it is nearly always indicative of pelvic contraction. This is not true, especially if applied to the negro woman, in whom a normal diagonal conjugate is frequently found under these circumstances. It is a matter of common observation that an external conjugate of 19 cm., 18 cm., 17 cm., or 16 cm. is found, and yet many of the women are delivered after a natural labor. One of two conditions exists:

1. The external conjugate is diminished, but the internal is normal. This is due to thinness of the sacrum, and is found in women who possess small structural development of the skeleton.

2. There is some diminution of the obstetrical conjugate or of all the internal pelvic diameters, but Nature takes care of these women by giving a small baby to pass through a small pelvis. The product of conception is small and the pelvis is small because of non-development of infant and mother. The relation between the diminished weight of the infant and the degree of shortening of the external conjugate diameter of the mother's pelvis is shown by the accompanying diagram, and is based upon the averages of 272 observations.

On the other hand it is claimed that contraction of the internal conjugate is rarely found to exist when the external measures 20 cm. or more. In Case XVIII of the series of Cesarean sections reported in this paper, the external con-

jugate measured 20.5 cm. The other external diameters were also normal or above, and yet the woman had a contracted pelvis with a true conjugate of 9 cm. ($3\frac{3}{5}$ inches). Another case recently came under my observation with an external conjugate of 20 cm., and the woman had a true conjugate of only 7.5 cm. (3 inches). The interspinous was 25 cm. and intercrestal 28 cm. The only external measurements to excite suspicion were the right and left obliques, which were 2 cm. to 3 cm. short. At her first labor I effected delivery by symphysiotomy. One year later she entered the hospital at the seventh month of pregnancy in premature labor. The waters had escaped and the legs of the infant were in the vagina. Although a small premature infant it was delivered dead by traction, aided by strong suprapubic pressure.



The importance of measuring the external obliques is not generally recognized. At the San Francisco Maternity the classification of pelves is based upon the length of these external diameters and the true conjugate. Another case illustrating the importance of the length of the external obliques was examined within the past few days. The woman had been delivered by difficult high-forceps extractions twice, with both babies large and dead. She was five months' preg-

nant with her third gestation when I examined her with her physician, Dr. D'Arcy Magee. All of the diameters were normal (including the diagonal conjugate) except the external obliques. The right was 20 cm., and left 19 cm. The internal obliques were clearly diminished by the encroachment of the iliac planes within the pelvic space.

Between the spines	24.5 cm.
Between the crests	25.0 cm.
Between the tuber ischii	11.0 cm.
External conjugate	20.0 cm.

This case will be put on Prochownick's diet after the sixth month of gestation, and will be delivered by the induction of premature labor or by Cesarean section at term early in April, 1908.

Pelvimetry should be performed at the eighth month of pregnancy in all primiparæ, and in those multiparæ who have passed through difficult labors. If neglected until the advent of labor it should be done then in all cases where the head is high, and especially before any attempts are made to deliver by forceps. Shortening or disproportions of any of the pelvic diameters should always excite suspicion. One can clearly understand the importance of the practice of pelvimetry by all practitioners who undertake obstetrical work. Unnecessary complications make it unpopular. Some of these are the useless refinements of the measurements, including small fractions of a centimeter or inch, and the many varieties of pelvimeters which claim to possess particular advantages for accurately measuring the diameters of the maternal pelvis and the fetal head.

In minor degrees of pelvic contraction the length of the pelvic diameters *alone* is not all important; the size of the infant's head *alone* is not all important; it is the relative disproportion between the head and the pelvis. Can *this* head mould and pass through *this* pelvis? is the question to decide. The answer must be sought by the result of palpation.

Palpation requires no complicated instruments, and a little practice enables one to obtain valuable information. By it the obstetrician can ascertain the size of the uterine tumor, the relative proportion of the contents, infant, and amniotic fluid; and, consequently, can form a fairly accurate opinion of the size of the infant—whether small, of average size, or large. The position of the infant is made out, and if it is a head presentation whether or not the head is engaged within the inlet. If not engaged, Can it be made to do so by pressure in the line of the axis of the superior strait? In a primipara the head should always be engaged, under normal conditions, and descended within the pelvic cavity after the eighth month of gestation; in a multipara, if disengaged and movable above the brim, it ought to engage by suprapelvic pressure with or without anesthesia.

In minor degrees of pelvic contraction discovered in the thirty-second week of pregnancy, modern obstetric practice points out three lines of treatment, viz.:

1. The induction of premature labor.
2. Elective Cesarean section.
3. Delay until labor has demonstrated the resources of Nature, then—
   - (*a*) Spontaneous delivery.
   - (*b*) Version.
   - (*c*) Axis-traction forceps.
   - (*d*) Cesarean section.
   - (*e*) Symphysiotomy or pubiotomy.
   - (*f*) Craniotomy.

1. The Induction of Premature Labor. We must recognize that there is a slight increase of danger to the mother, and a very material risk to the infant by this method. The earlier the interference is required the greater the risk to the infant; therefore, the indications for inducing labor are not justified before the completion of the thirty-sixth week of pregnancy, unless the mother had previously given birth to very big babies. Beginning at the thirty-second week the

case should be tested weekly to see that the head can be pressed down into the inlet. If it can be carried on in this way to the thirty-sixth or thirty-seventh week, labor may be induced. If engagement cannot be made successful before that time, it is not, as a rule, a proper case for the induction of labor. If the disproportion be decided it is a case for elective Cesarean section; if not decided it may go to full term, and after labor pains have been in progress for several hours it may still be a proper case for section unless there is good assurance of a successful delivery per vias naturales.

Whether labor has been induced or is spontaneous, the case should be conducted along such lines that the patient will be in a favorable condition for Cesarean section should it prove advisable. Few examinations should be made, and these with the most rigid, aseptic precautions.

In case moulding and engagement have occurred, and the conditions give promise of a successful forceps delivery, the woman should be placed in the Walcher position and the instruments employed. If failure results, and the efforts at artificial delivery have not been protracted, the course of action must be guided by the condition of the infant. If its life has been seriously jeopardized, or if destroyed, craniotomy would be indicated. If the heart sounds of the infant be good, and there is hope of saving it, a symphysiotomy or pubiotomy would be called for.

2. Elective Cesarean Section. When the disproportion between the diameters of the fetal head and the mother's pelvis is decided, and the head cannot be forced into the inlet by pressure under chloroform, the chance of a successful delivery by the natural passages is so small that Cesarean section should be performed at a period shortly anticipating full term. The best results of the operation are obtained in these cases. If the os be patulous no trouble will be met with from deficient drainage; if not it may be dilated from above downward and a gauze drain inserted. Others might prefer, under the latter circumstances, to wait long enough for labor

pains to effect some dilatation. My first Cesarean section was performed in 1890, and reported in the *Transactions of the American Gynecological Society* for that year. On the fifth day the temperature rose to 101.5°, and the lochia had a bad odor. The cervix was small and the os closed. The canal was dilated with steel instruments; the uterine cavity explored and washed out with 2 per cent. solution of carbolic acid. The immediate effect of the manipulation was to increase the temperature to 104°; it fell to 99.8° that evening, and then remained normal.

3. Delay Until Labor Has Demonstrated the Resources of Nature. This course will be pursued when the disproportion is not great and there is good ground to hope for delivery by the natural passages.

(*a*) In the most favorable cases spontaneous delivery will take place. In minor degrees of pelvic contraction it has occurred in two-thirds of the cases. Moulding, engagement, and descent of the head, with good labor pains, hold out promise of success.

(*b* and *c*) If failure results, version and axis traction are held in reserve. Interference by either of these methods should not be attempted unless there is every reason to expect a successful issue. Failure jeopardizes the chances of a subsequent abdominal section.

In deciding between version and high forceps the choice will be guided by the experience of the individual operator—some preferring one, and some the other. Version is contraindicated in the justominor pelvis, as a rule. Some obstetricians perform version if the head be movable above the inlet, and high-forceps operation if engaged. Personally, I believe it is obsolete practice to perform version or high forceps in any case when a test of labor pains fails to engage the head and it cannot be forced through the brim with the patient under chloroform. This statement will be challenged by some obstetricians whose opinions are colored by the teachings of the Dublin and Edinburgh schools.

Wright, of Toronto, gives this advice in his *Text-book of Obstetrics:*

"If, at the end of one hour (of labor), the head shows no tendency to engage the brim, turn, and treat as an ordinary pelvic presentation."

Again in minor degrees of contraction of the conjugate (4 to $3\frac{1}{5}$ inches, 10 cm. to 8 cm.):

"Perform version as soon as possible, and treat as an ordinary breech case; or, allow the head to mould through the brim, and let Nature complete the delivery; or allow the head to mould two or three hours, and then use forceps."

The work of Milne Murray has advanced the claims of high forceps, and he is reported as having successfully delivered infants by this means, with the woman in the Walcher position, through a conjugate of $3\frac{1}{4}$ to $3\frac{1}{2}$ inches (8 to 8.75 cm.).

Lapthorn Smith,[1] of Montreal, says:

"I am strongly in favor of high forceps rather than turning in minor degrees of pelvic contraction. I have delivered a living child with high forceps where labor had been going on furiously for twenty-four hours without the head having engaged at the superior strait."

Others are not enthusiastic supporters of either axis traction or version in minor degrees of contraction.

Reuben Peterson[2] says:

"I do not favor high forceps as a treatment of minor degrees of pelvic contraction. I think it is one of the most dangerous operations for both mother and child that we have in obstetrics. Versions are a little better, but not much."

Joseph B. De Lee[3] says:

"Regarding high forceps and version in contracted pelvis, I am using both less and less as they are very serious operations for mother and also for babe. I avoid them by inducing labor, and by Cesarean section."

[1] Personal communication.

[2] Personal communication.

[3] Personal communication.

E. G. Grandin[1] says:

"Version would be my choice with head not engaged, cervix dilated or dilatable, membranes unruptured or just ruptured. High forceps, head not engaged. I never counsel."

E. Gustav Zinke[2] says:

"If, in a given case, I cannot deliver the patient with any degree of assurance of safety with the high-forceps application or version, I prefer to do a Cesarean section."

Franklin S. Newell[3] says:

"Personally, I prefer the abdominal route in all cases in a condition to go through the operation, where there is any reasonable doubt about the ability to abstract a living child through the pelvis, for I believe in proper hands the prognosis of Cesarean section, in proper cases at least, is no worse than that of version or high forceps. . . . The question of choice of operation between high forceps and version always appears to me in this way: that if a high forceps is attempted carefully and fails, version can be subsequently performed; whereas, if version is performed as the primary operation and fails, we have no operation left except a destructive one, for we have sacrificed the chances of the baby. So that personally I prefer a high forceps, or, at least, an attempted high forceps in all cases of head presentation in which I have decided to deliver per vias naturales, rather than to perform a primary version. I recognize that it is a matter of personal equation, and I consider version a somewhat more dangerous but also more efficient operation than high forceps.

"I strongly believe, however, that we should extend our indications for Cesarean section to include the majority of cases in which high forceps or version may be rendered necessary by pelvic contractions."

[1] In 1890 Grandin published a paper in the Transactions of the American Gynecological Society expressing advanced views advocating Cesarean section, which practically cover the ground taken in this paper.

[2] Personal communication.

[3] Personal communication.

Guided by these expressions of opinion, and by my own experience, I believe that in cases of labor in minor degrees of pelvic contraction one should "delay until labor has demonstrated the resources of Nature," and then act as follows: After from two to six hours of labor, according to the severity of the pains, if the head has not engaged, perform Cesarean section and not forceps or version. If the head has engaged, attempt a careful application of the axis traction, with the woman in the Walcher position, and if the result does not give some assurance of success, perform Cesarean section. I believe version and axis traction, with the head disengaged, are contra-indicated by modern obstetric practice.

(*d*) The indications for delivery by Cesarean section should cover cases of minor degrees of pelvic contraction where a few hours of labor pains demonstrate the inability of Nature to mould and engage the head. This indication should be extended to embrace those borderline cases in which the conjugata vera is even as much or more than 8.5 cm. for the justominor, and 9 cm. for the simple contracted pelvis. Inability to force the head through the inlet under chloroform should be recognized as a justification for the operation, regardless of the degree of contraction.

Case XVIII of the series reported will illustrate this position. The woman entered Columbia Hospital in the beginning of her fourth labor. The first labor was terminated successfully with a difficult high-forceps operation. The infant was not as large as the subsequent ones, and survived with bad head injuries. The second and third labors were terminated in the same way, and both infants were delivered dead. The external pelvic measurements were unusually good.

Interspinous	25.0 cm.
Intercristal	28.0 "
External conjugate	20.5 "
Diagonal conjugate	10.5 "

The woman had a simple contracted pelvis with an estimated true conjugate of 9 cm. ($3\frac{3}{5}$ inches). Under chloroform

the head could not be made to pass the inlet. She was delivered by section and left the hospital in good condition at the end of three weeks. Her infant weighed nine and three-quarters pounds, and was vigorous and did well. At the woman's request to be made sterile her tubes were cut and the ends turned in between the folds of the broad ligaments.

High-forceps extraction would have sacrificed the infant's life and been as dangerous to the mother as the section.

Labor might have been terminated by version with little risk to the mother, but much danger to the infant—a biparietal diameter of 9.75 cm., with a well-ossified head, would have had to pass through a conjugate diameter of 9 cm.

Symphysiotomy or pubiotomy would most likely have saved both mother and infant, but the tedious convalescence was a deterent; also, delivery by any of those methods—forceps, version, symphysiotomy or pubiotomy—would have left the woman exposed to the risk of subsequent pregnancies and labors. Therefore, in this case, or any similar cases, when the head remains above the brim after several hours of labor pains, and when it cannot be made to engage by strong suprapubic pressure under chloroform, modern obstetric surgery points to the advantage of Cesarean section.

Cases XIV, XV, XVI, and XVII, were justominor pelves and labor had continued from twelve to thirty hours without engagement of the head. Three were primiparæ and No. 16 had previously given birth to a dead infant. A brief report of these cases is as follows:

Case XIV.—Beatrice J., colored, aged seventeen years, occupation laundress, single, was admitted to Columbia Hospital, May 23, 1907. Pelvic measurements gave a justominor pelvis with a true conjugate of 8.5 cm. ($3\frac{2}{5}$ inches). True labor pains began 8 A.M., May 24, and at 7.30 P.M. became quite strong. Examination under chloroform, head not engaged. Cervix dilated manually. At 11.30 membranes ruptured artificially; head tightly wedged in the brim. Forceps tried unsuccessfully. Cesarean section at 1.30 A.M.,

May 25. Baby delivered in three minutes; time of operation thirty-two minutes. Patient ran quite a temperature, on the fifth day reaching 104°, and dropped to normal on the ninth day. Sat up on the nineteenth day and went home on the twenty-fourth day. Mother and baby did well. Weight of baby at birth, eight and three-quarters pounds.

Case XV.—Daisy T., colored, aged twenty-six years, housewife, admitted to hospital, May 27, 1907, at 5.25 A.M., having been in labor for fourteen hours; pains very strong. Justominor pelvis; true conjugate 7 cm. ($2\frac{4}{5}$ inches). The patient had been examined by a midwife four times without regard to asepsis, and lard was used as a lubricant for the fingers. Cesarean section performed at 1.30 P.M. Time for operation, thirty-three minutes. Highest temperature 101.5° on the second day; reached normal on the sixth day. Abdominal distention relieved by stomach tube. Discharged June 27 in good condition. Baby weighed seven pounds and six ounces; not strong at time of leaving hospital.

Case XVI.—Katherine L., colored, aged twenty years, married, housewife, was admitted April 18 with tertiary syphilis, and condylomata on right side of vulva. Symptoms cleared up in two weeks by specific treatment. Justominor pelvis; true conjugate 9 cm. ($3\frac{3}{5}$ inches). Labor began 2 A.M., May 27, 1907. After twelve hours of labor head not engaged and could not be forced into the pelvis by pressure under chloroform. Cesarean section performed at 3 P.M. Baby delivered in two and one-half minutes; time of operation thirty-seven minutes. Recovered without complication; baby alive and weighed five pounds and fourteen ounces.

Case XVII.—Martha T., colored, aged thirteen years, single, admitted in labor June 13, 1907, at 12.30 A.M. Justominor pelvis; true conjugate 6.5 cm. ($2\frac{3}{5}$ inches). Twelve hours labor; Cesarean section. Baby delivered in three and one-half minutes; time of operation, thirty-seven minutes. Weight of baby seven and one-quarter pounds. Mother and infant left the hospital in good condition on the twenty-sixth day.

These four sections were performed within three weeks, and two of them on the same day.

(*e*) *The Indications for Symphysiotomy and Pubiotomy.* The objections to these methods of delivery are the tedious and painful after-treatment and retarded convalescence. A retention catheter will obviate the difficulty and pain of catheterization. The necessity of keeping the bones in apposition, the maintenance of the back position for two or three weeks, the difficulty of keeping the parts clean, of giving vaginal douches and proper attention to the evacuation of the bowels, are some of the serious drawbacks to either operation. The employment of a bed or douche pan is so painful that, for the first week, it renders life almost unbearable. Unless one is provided with a special bed it is well to use a cot having a canvas cover with a hole cut out beneath the buttocks to permit this attention without moving the patient.

Complications met with afterward are: tearing of the anterior vaginal wall, edema or hematoma of the vulva, foul-smelling lochial discharge, fever, and septic phlebitis. The maternal mortality after symphysiotomy and pubiotomy is practically nil in the primary operations. Death occurring after the secondary operations are due to infection and complications resulting from ineffectual efforts at delivery by forceps before resorting to these operations. Pubiotomy seems to offer little if any advantages over symphysiotomy. In a study of this operation in America I was able to collect 20 cases: 12 primary, with no maternal death, and 8 secondary with 4 deaths. On account of the serious objections stated I believe it will seldom be performed as a primary operation. Symphysiotomy and pubiotomy will, however, remain useful expedients when one is forced to resort to one or the other in preference to craniotomy upon a living child. When the woman has been exhausted by prolonged labor, by manipulations, by the use of forceps, and when the parts are contused and lacerated and she is probably infected, nothing else remains to be done.

ABDOMINAL CESAREAN SECTIONS.
(Dr Fry's service at Columbia Hospital.)

The following case came under my care recently:

On returning to Washington, October 1, 1907, from a vacation, my attention was called by my associate, Dr. Edgar Snowden, to Mrs. B., a primipara, seven and one-half months pregnant. Her husband was in the Navy, and she had come from his station in Samoa to be confined. She had a justo-minor pelvis and my investigation confirmed his measurements. They were as follows:

Interspinous	23 cm.	
Intercrestal	24 "	
External conjugate	18 "	
External obliques:		
Right	23 "	
Left	22 "	
Diagonal conjugate	11 "	
Estimated true conjugate	99 "	($3\frac{4}{5}$ inches)

Palpation. Large uterine tumor, normal quantity of amniotic fluid, large infant. At the time of my examination she had reached the thirty-second week of gestation. The head could be made to engage within the brim at weekly examinations, made to the thirty-seventh week. Cesarean section was considered, but the case gave promise of successful delivery by induced labor. She entered my private hospital and premature labor was induced after some delay. A bougie was inserted, removed, and replaced the following day. No pains having been excited the lower segment was packed with gauze. Labor began November 4, 1907. The membranes ruptured spontaneously at 8 A.M., os dilated at 2 P.M., head partially engaged with occiput posteriorly. At 4.30 forceps were employed without success. Patient was taken to the operating-room and axis traction employed with the patient in the Walcher position. The head was brought down into the cavity with a persistent occipitoposterior position. The head was large and well ossified. Effort at manual rectification failed on account of the small pelvic space. The infant's heart sounds were strong, and craniotomy was

therefore, considered to be contra-indicated. The promising time for Cesarean section had passed because of the eight hours of hard labor, the manipulations with bougies and gauze packing, the insertion of the hand in the effort to rotate the head, and, finally, the attempts to deliver by forceps. Symphysiotomy was then performed. The joint separated only 1 cm., which increased to 3 cm. during forceps extraction. The head was delivered with the occiput posterior.

The perineum was lacerated in the second degree, and the anterior vaginal wall was torn from its pubic attachment. There was no hemorrhage. Lacerations sewed up and the patient bandaged and put to bed. The highest temperature was reached on the third day, 100.4°. There was marked edema of the left labium major from the sixth to the tenth day. The perineal stitches of silkworm gut were removed on the thirteenth day, and perfect union resulted. The laceration of the anterior vaginal attachment healed satisfactorily. There was some odor to the lochia for eight days.

Examination on Seventeenth Day. Union of symphysis good, except a V-shaped indentation at the lower border. Patient turned on her side and no movement was felt at the joint. Slight motion at the symphysis by grasping the iliac crests and rocking the pelvis. The infant weighed nine and three-quarters pounds, and was none the worse from the delivery except an abrasion on the neck behind the right ear.

The large size of the infant and the persistent occipito-posterior position prevented a successful delivery with the forceps. In the event of a subsequent pregnancy I should perform an elective Cesarean section and sterilize the patient. She left the hospital at the end of the fifth week; herself and baby in good condition. The joint union was firm and she walked well.

Another indication for selecting symphysiotomy and pubiotomy may also be recognized when facilities are not at hand for performing Cesarean section.

(*f*) *Craniotomy.* The indications recognized for per-

forming craniotomy are after prolonged labor, or failure of version or forceps, and the infant is dead or dying. The diminution of the true conjugate must not be below the limits of an absolute indication for Cesarean section. If craniotomy be rejected on account of the chances of saving the child, symphysiotomy or pubiotomy must be performed if the woman is not in a condition for Cesarean section.

Of the 18 operations reported in tabular form, 10 were colored women, and 8 white. The 18 sections were performed within a period of eighteen years; 2 were done within the first thirteen years of that period, and 16 in the last five years. The larger number of operations in the latter period is accounted for by the fact that the relative indications for performing Cesarean section have gradually been broadened to embrace those cases which were formerly submitted to high forceps and version.

The results have shown no increase of danger to the mother, and they have recovered without sepsis and lacerations of the birth canal. In regard to the infants we notice this difference: Living babies are now carried away by the mothers, and not dead babies by the undertaker. Of the 18 infants, 16 were viable and 15 lived. Three of the cases with pelvic deformity (IX, XV, XVIII) had previously given birth to 6 infants—1 alive and 5 dead. The dead babies had been delivered by difficult high-forceps operation. High-forceps extraction in these cases at Columbia Hospital has produced 7 dead infants in the last 20 operations, with a fetal mortality of nearly 33 per cent.

The only viable baby lost was in Case IV. It weighed five pounds and thirteen ounces. The other two dead infants were one (Case VII) at the seventh month, weighing three pounds, removed by Cesarean section for a fibroid blocking the pelvis; and one (Case VIII) removed at six and one-half months of pregnancy for a placenta previa centralis.

Case	Date.	Color.	Diameters in centimeters.							Hours labor.	Previous labors.	Indication for operation.	Result to mother.	Result to infant.	Weight of infant.	Remarks.
			Inter-spinous.	Inter-crestal.	Right oblique.	Left oblique.	Conj. externa.	Conj. diagonal.	Conj. vera.							
1	February 9, 1890	W	19.0	14.0	..	..	14.0	..	4.0	39	....	Absolute; dwarf; flat; gen. cont.	Recovered	Lived	..	Reported in Transactions American Gynecological Society, 1890.
2	August, 1894	..	..	..	..	..	..	..	..	..	....	Rachitic; flat; absolute	Recovered	Lived	..	Elective operation. Patient of Dr. W. S. Bowen. Operation at Garfield Hospital. Records lost.
3	March 13, 1903	C	23.5	25.0	..	..	19.5	..	..	48	2 normal	Normal pelvis; ventrofixation	Recovered	Lived	6 lbs. 12 oz.	Dystocia due to ventrofixation.
4	April 14, 1903	C	23.0	23.0	19.0	18.0	16.0	9.0	7.0	20	....	Flat; generally contracted.	Recovered	Died	5 lbs. 13 oz.	Absolute indication. Infant still-born.
5	October 13, 1903	C	..	..	..	..	..	..	..	..	....	Elective; hip-joint disease; oblique cont. pelvis	Recovered	Lived	8 lbs.	Scoliosis. Rachitic, flat pelvis. Absolute indication. Operation at Garfield Hospital. Records lost.
6	November 17, 1903	C	24.0	28.0	22.0	22.0	17.0	8.0	6.5	12	....	Flat, rachitic pelvis; absolute	Recovered	Lived	7 lbs. 4 oz.	Head not engaged. Absolute indication.
7	February 22, 1904	W	23.5	26.5	19.5	..	..	..	..	..	2 normal	Fibroid in pelvis	Recovered	Died few hours	3 lbs.	Normal pelvis. Operation at seventh month of pregnancy. Porro.
8	1904	W	..	..	..	..	..	..	..	..	....	Normal pelvis; placenta previa	Recovered	Died	..	Primipara. Placenta previa centralis. Six and one-half months. Cervix contracted. Severe hemorrhage. Baby lived few hours.
9	December 4, 1904	C	19.0	20.5	20.5	20.5	17.5	8.0	6.5	..	Two. Long & difficult. 2 dead children	Flat; generally contracted	Recovered	Lived	7 lbs.	No record of length of labor. Indications absolute.

10	December 19, 1904	W	24.0	27.0	22.0	22.0	20.0	..	..	40	....	Funnel-shaped pelvis	Died	Lived	9 lbs. 4 oz.	Forceps failed. Head in cavity. Outlet contracted. Pelvic inlet normal.
11	March 18, 1905	W	25.0	22.0	..	..	18.0	9.5	8.0	18	....	Simple flat pelvis	Recovered	Lived	6 lbs. 12 oz.	Head could not engage.
12	December 6, 1905	C	22.0	23.0	18.0	19.0	17.0	9.0	7.0	16	....	Justo minor	Recovered	Lived	7 lbs. 12 oz.	Head could not be made to engage by pressure under chloroform.
13	January 18, 1906	W	21.5	25.5	20.5	20.5	18.0	6.5	5.0	..	....	Dwarf; absolute; generally cont. flat pelvis	Recovered	Lived	6 lbs. 4 oz.	Elective operation.
14	May 25, 1907	C	23.5	25.0	19.5	19.0	16.5	10.0	8.5	17	....	Generally cont. flat pelvis	Recovered	Lived	8 lbs. 12 oz.	Forceps attempted. Head could not be forced into inlet by pressure under chloroform.
15	May 27, 1907	C	21.0	23.5	20.0	19.5	16.5	8.5	7.0	21	1 dead baby	Justo minor	Recovered	Lived	7 lbs. 6 oz.	Head not engaged and could not be pressed into inlet under chloroform.
16	May 27, 1907	C	21.0	23.5	18.5	19.5	17.0	11.0	9.0	12	....	Justo minor; head not engaged	Recovered	Lived	5 lbs. 14 oz.	Head could not be pressed into brim under chloroform.
17	June 13, 1907	C	20.0	22.0	18.0	18.5	14.0	8.0	6.5	20	....	Justo minor; head not engaged	Recovered	Lived	7 lbs. 4 oz.	Head could not be made to engage under chloroform.
18	October 13, 1907	W	25.0	28.0	..	..	20.5	10.5	9.0	3	3 high forceps; 1 alive; 2 dead; 3 dead	Simple contraction; head not engaged	Recovered	Lived	9 lbs. 12 oz.	Previous labors were difficult, axis traction forceps, and with babies dead.

Thirteen of the women were primiparæ: 5 had previously given birth to children; 3 have already been mentioned; 2 had each had two babies normally because there was no pelvic deformity. They were Cases III and VII who were operated upon for the result of a previous ventrofixation and for fibroid in the pelvis.

The indications for Cesarean section were absolute in 8 cases.

Of the 15 cases of pelvic deformity the following classification was made:

Justominor and flat, generally contracted pelvis	9
Rachitic flat pelvis	3
Simple flat pelvis	2
Funnel-shaped pelvis	1

The fatal maternal case was in a primiparæ with a funnel-shaped pelvis. She had been in labor thirty-six hours and forceps had been applied four times. My preference was for a symphysiotomy, but the family requested Cesarean section. The woman was the wife of a naval officer and it was desired to make her sterile, as subsequent pregnancies might occur at some point removed from skilled assistance. Death occurred on the third day from acute dilatation of the stomach.

The symptoms appeared soon after the patient was removed from the operating table. The pulse ran up to 130, and the temperature to 101° the same evening. The next morning the abdomen was distended. Insertion of a rectal tube and high enemata gave no result. On the second day the bowels moved freely from hypodermic injections of eserine salicylate. There was little vomiting; some gas escaped by eructation. Calomel was given in small repeated doses and food and stimulants were retained. On the third day the distention increased and the pulse became more rapid and feeble. Death occurred, and autopsy revealed the peritoneum clean and free from infection and the uterine incision healed. The intestines were empty up to within a few inches of the stomach,

where the duodenum was found kinked or twisted longitudinally upon itself. The stomach was enormously distended. The use of a stomach tube and postural treatment would most likely have saved the patient. The true condition was not recognized at the time.

Case XV of the series tabulated presented postoperative symptoms of a similar character, but was promptly relieved by washing out the stomach.

DISCUSSION.

Dr. W. P. Carr, of Washington, D. C.—Dr. Fry has spoken of the tedious convalescence following symphysiotomy and the difficulties attending that operation. I believe that this tedious convalescence can be entirely overcome, and that the objections to symphysiotomy can be overcome if the operation is done in a proper way.

The first objection to symphysiotomy is the chance or danger of infection if it is done by open incision. If the wound is made high up there is no more chance of infection than an ordinary laparotomy. The skin incision need not extend farther down than the upper border of the symphysis; a retractor is then put in and the skin drawn down to the lower border of the symphysis. In the second place the danger of hemorrhage can be entirely overcome by separating the tissues from the bone, keeping close to the periosteum for one inch on each side of the symphysis before the symphysis is cut. If that is done there is no danger of tearing the pampiniform plexus or any of the large bloodvessels.

The next objection is that of weakening the sacro-iliac joint, and if an assistant prevents too wide an opening of the symphysis, not more than two and one-half inches, there will be no trouble on that score. The tedious convalescence is almost entirely due to the mobility of the bones, and if the bones are wired after the operation, that objection will be entirely overcome. I cannot see why anyone should raise objection to wiring the bones after symphysiotomy. It is unnecessary in these cases to put the wire clear through the bone (illustrating). I use galvanized iron wire, believing that it is much

stronger than silver wire, and the bones can be held so firmly with it that there is absolutely no trouble. We need not put strips around the symphysis. I have followed the method I have described in the last three cases, and convalescence has been just as easy as after ordinary normal labor.

Dr. Henry T. Byford, of Chicago.—I am not at present doing any obstetric work, but I would like to call attention to one point, namely, pressing the fetal head into the superior strait. My preceptor, who was my father, began to practise before the days of accurate pelvimetry, and he laid stress on the fact that so long as we can press the fetal head into the pelvis, we can wait. I think that it is a point which at the present time should be emphasized—the relation between the head and the pelvis. It is, so far as it goes, of as much importance as the actual measurements.

A FLAP SLIDING OPERATION FOR RECTO-VAGINAL FISTULA, LEAVING PERINEUM AND SPHINCTER MUSCLE INTACT.

EXCISION OF FISTULA IN ANO WITHOUT CUTTING THE SPHINCTER MUSCLE.

By George H. Noble, M.D.,
Atlanta, Ga.

I have two things that I wish to show you. Little things that simplify technique and facilitate recovery of the patient are worthy of knowing.

The first is an operation for the relief of rectovaginal fistula in the lower end of the vagina when the sphincter muscle and perineum are intact. In this I have carried a little farther the principle I presented a few years ago of making a flap of the anterior wall of the rectum and drawing it external to the anus in cases of complete laceration of the perineum. At the time I stated the operation was useful for rectovaginal fistula. Since then it occurred to me the same thing might be practised on the vaginal side of the recto-vaginal septum.

The technique is simple. It consists of a moderate and careful dilatation of the sphincter muscle, carefully avoiding laceration of its sheath. The anterior wall of the rectum is dissected off, cutting through the middle of the fistula and drawing the flap external to the anus far enough to permit excision of the part of the flap containing the original rectal end of the fistula. A similar flap is made on the vaginal side.

The posterior vaginal wall is dissected free and drawn down until the vaginal end of the fistula is external to the ostium vaginæ. The portion of the flap containing the opening is then cut off. The margins of the two flaps are then sutured respectively around the anus and vaginal orifice. It will be observed that one-half of the fistula is removed in trimming off the end of the rectal flap, and that the remaining portion is excised in cutting away the corresponding part to the vaginal flap. The principle is simple and easy, and cuts out all chances of infection from either the vagina or rectum, and avoids the necessity of rectal or vaginal sutures. The only stitches used are placed at points easy of access on the outside.

The second operation is excision of fistula in ano without cutting the sphincter muscle. It consists in careful and moderate dilatation of the sphincter without laceration of its sheath; dissecting off either the anterior or lateral wall of the rectum, as the case may be, drawing down the flap containing the rectal opening, and cutting it off as described in the above operation. Next, sharp-pointed scissors are inserted just external to the sphincter muscle and its blades carefully separated. This will liberate the muscle and permits it being displaced to one side and out of the way. The fistulous tract is then cut out. The incision made is closed with silkworm-gut sutures. The muscle is returned to its natural bed and the rectal flap is turned over it and sutured to the skin margin with catgut. The subsequent treatment is antiseptic, or moist salt dressing, and careful evacuation of the bowels about the fourth or fifth day. At the end of that time the patient is practically well.

I wish to emphasize the point that this operation is intended for fistula in ano only, and is not applicable to extensive suppurations or cases with ischiorectal abscesses.

Both of these operations have proved successful in my hands.

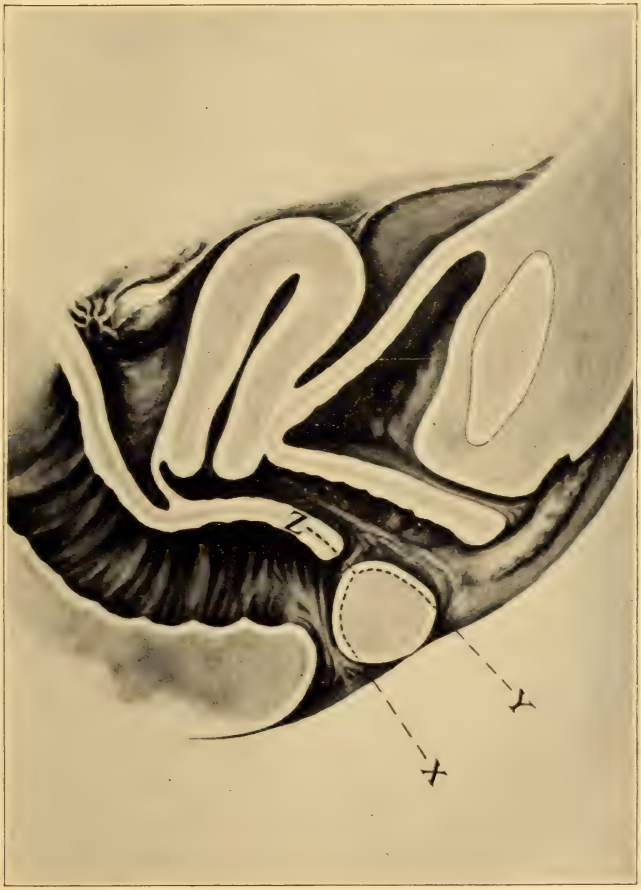


FIG. 1.—The anterior rectal wall is dissected from the vagina following a line passing through the middle of the fistula, "X Z." A similar flap is made on the vaginal side of the rectovaginal septum following the line "Y Z."

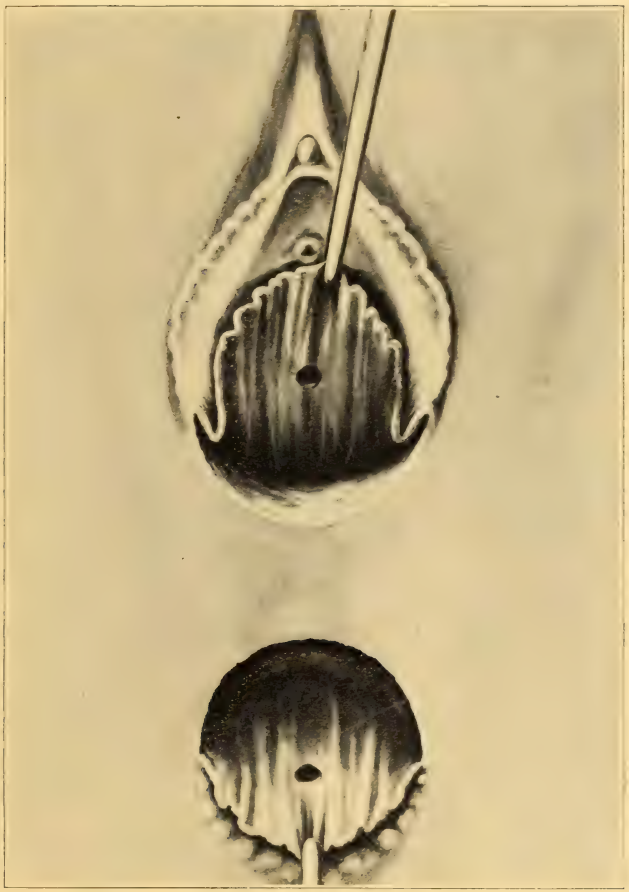


Fig. 2.—After these flaps are dissected free, they are drawn external to the anus and vaginal orifice.

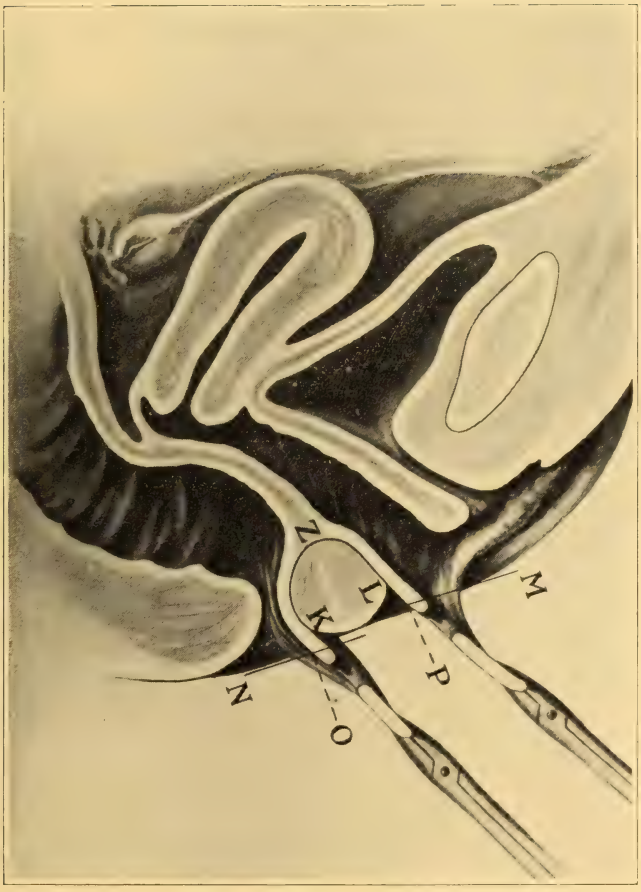


Fig. 3.—The flaps are cut off behind the fistulous openings following the lines "O N" and "M P." The edges of the flaps are then stitched to the margins of the skin around the anus at "K" and the vaginal orifice at "L."

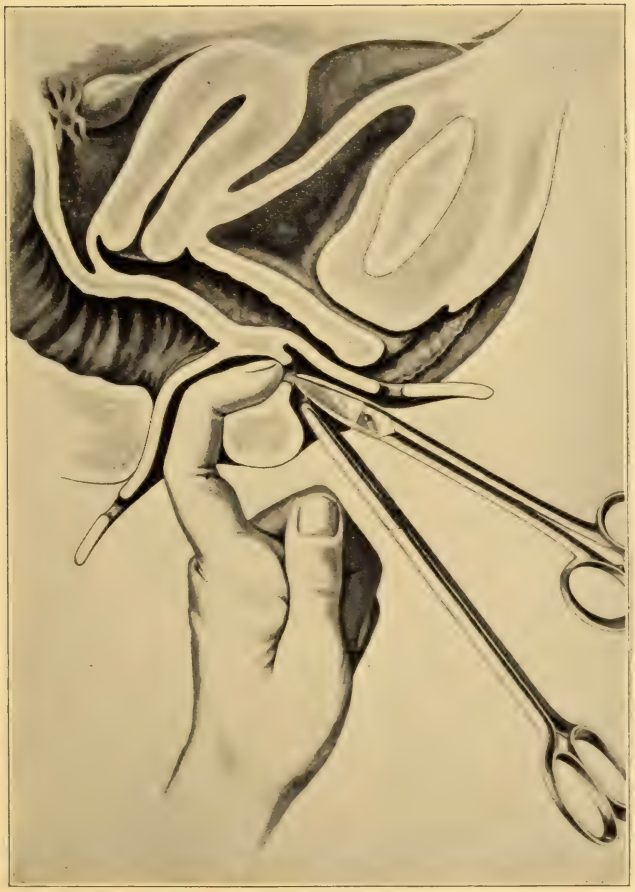


Fig. 4.—Should the fistula be situated so close behind the perineum that the line does not pass through its centre and a portion of the fistula remain, it may be dissected out by elevating it with the finger and forceps.

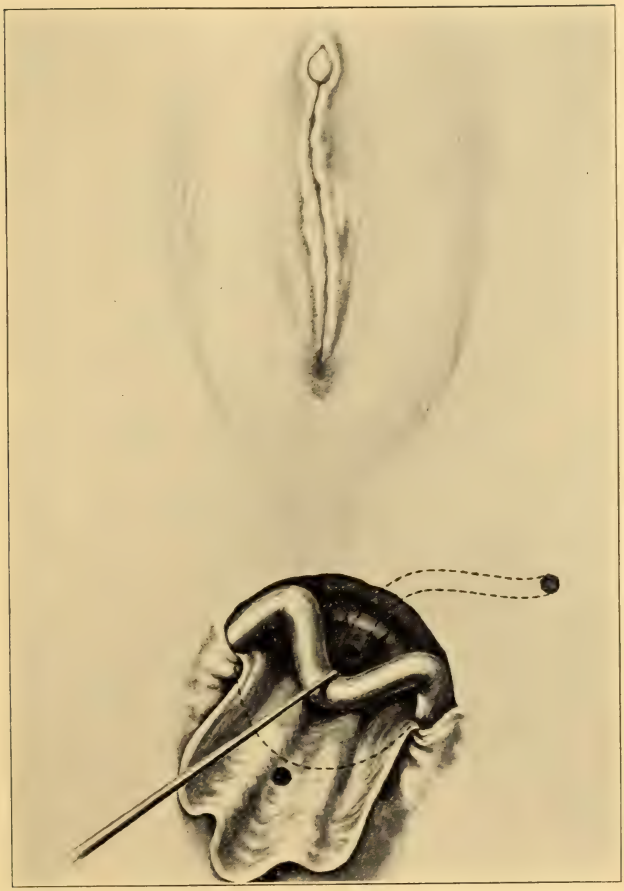


FIG. 5.—Flap is dissected from the rectum as described in the above operation, and drawn external to the anus. The portion containing the fistulous opening is cut away following the dotted line.

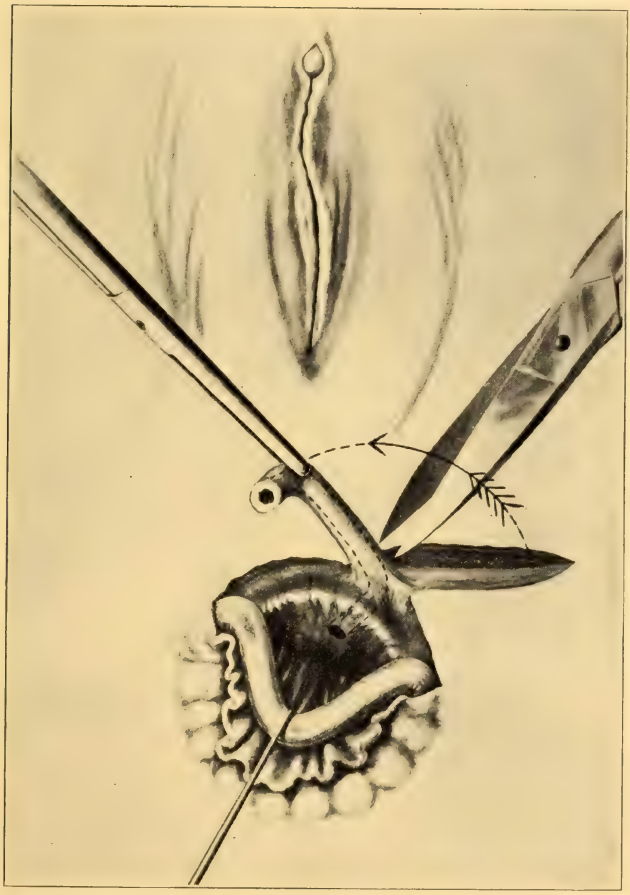


Fig. 6.—The sphincter is then displaced to one side and the fistulous tract completely excised.

FIG. 7.—The incision is closed with silkworm-gut sutures; the sphincter muscle returned to its normal position; the flap turned over it, and sutured to the skin margin with catgut.

DISCUSSION.

Dr. Henry D. Fry, of Washington, D. C.—I want to speak of one point Dr. Noble mentioned, and that is, he says in drawing the mucous membrane down from the vagina and also from the rectum, it cures the rectocele. I would like to ask him how that manages to cure the rectocele which is due to some laceration of the muscular fibers of the levator ani? An important point in curing rectocele is to bring together these muscles. Does he do some repair work other than pulling down the mucous membrane, cutting it off and stitching it?

Dr. Henry T. Byford, of Chicago.—I would inquire of Dr. Noble what is the use, after pulling down the rectal flap, of pulling down the vaginal flap unless there is a rectocle? He has eliminated the communication with the rectum, and I should think that sewing up the vaginal wound, after paring the edges, would complete the operation fully as satisfactorily, the more so since we can usually cure these cases without this procedure by taking a broad hold upon the tissues from the vagina.

Dr. Isaac L. Watkins, of Montgomery, Ala.—I have had some experience with the operation that Dr. Noble has been doing and has been talking about. I have frequently, in these complete lacerations, after separating the rectovaginal septum, pulled the gut down and made repair of the perineum over the gut, but have found that after the gut has been pulled down there would be some leakage from the anus. But the advantage I have seen from this operation is in those cases that are difficult to manage after the old operation of sewing up the gut and tying the stitch on the inside of the lumen of the bowel.

I have now under my care a woman upon whom I operated according to the old plan of putting the stitches in the lumen of the bowel. She is one of those who has a very sensitive stomach and bowels, so that she has had diarrhea more or less from the time of the performance of the operation, from the proverbial dose of castor oil given the day before the operation, and seemingly has never gotten over it. She developed a rectovaginal fistula following the operation by the old method. I cut the perineum open, which had completely healed, pulled

the gut well down, and sewed it on to the perineum, which I think is the best I can do under the circumstances.

One trouble I have had in connection with this operation is the difficulty of managing the sphincter ani. I have thought lately that I encountered more difficulty in getting the sphincter muscle to unite. If we pull the gut down we have to bring the sphincter muscle over the end of the gut, and you will remember we have one-third or one-half of the sphincter muscle to operate with, and to bring the gut down within the grasp of the sphincter muscle it takes a certain amount of space which you have for the anus after bringing the sphincter muscle together. The gut, in coming down through that, takes up a good portion of it, and you necessarily have a small outlet to the gut, making a serious objection to that operation. In this case, which is still under my observation, the woman is now getting well from the operation, which I have tried to do in accordance with the plan advocated by Dr. Noble. But she has an anus which is not larger than a small finger.

Dr. Edward H. Ochsner, of Chicago.—I should like to ask the essayist how long he has been doing this operation, and how many times he has done it for fistula in ano? It does not seem to me that the operation he suggests will promise as large a percentage of cures as the operation which many of us are doing now. We all know that it very often happens that the internal opening of a fistula in ano closes, and, in spite of the fact that it closes, the fistula up to the mucous membrane still persists. If my understanding of the operation the essayist has described is correct, the only thing he accomplishes by it is to obliterate the internal opening of the fistula. I doubt whether closing the internal opening of the fistula will cure the disease in a large percentage of cases. Many of us are now doing an operation which practically gives 100 per cent. cures without incontinence. I have yet to see a case that I have operated upon which was not cured by a single operation, there being no recurrence and no incontinence. If you can accomplish this by a simple operation, it certainly is not right to change to any other or more complicated one.

The essayist objects to the difficulty of the after-treatment in the present method of operating, the necessity of packing, etc. I believe that the packing and irrigation of rectal fistula is entirely unnecessary. If one would put these patients in

a tub bath at 93° for fifteen minutes every day, they would not need any irrigation and packing; and the rapidity and the comfort with which healing takes place is a surprise to those who have not tried this method of treatment.

Dr. Charles R. Robins, of Richmond.—I am sorry that I have not a case of rectovaginal fistula to report that has been operated on by Dr. Noble's method. I have been on the lookout for such a case for some time, but have not been able to run across one. I have had such excellent results from Dr. Noble's operation for complete laceration of the perineum, in which the same principle is embraced, that I am wholly prepared to endorse his operation for rectovaginal fistula. I have operated on quite a number of cases of complete laceration of the perineum by his method, and have not had a failure yet, and I believe the operation he has described today will be successful.

Dr. George H. Noble (closing).—In reply to Dr. Fry's inquiry about rectocele, I will say that my reference to it was incidental. It and other injuries to the floor of the pelvis should receive attention.

In the majority of cases there is some laceration of the perineum, although the sphincter may be intact. The fascia and muscles should be sutured together, and the strong or unstretched portion of the rectum anchored to the triangular or levator ani muscle. All this is coincident with the operation.

Dr. Byford questions the necessity of operating upon the vaginal side. While it is true that the closure of the rectal side cures fistula, I think it is a quick and easy way of remedying redundant tissue in the posterior wall of the vagina, or closing slight laceration. It requires no skill to dissect up the flap, cut it off, and bring the sides of the perineum together when lacerations co-exist.

Dr. Watkins, in discussing this operation, referred to a case in which he had stricture of the anus resulting. If the doctor will follow the technique I gave for the operation on the perineum, he will not have such an unfortunate occurrence again, because the length of the sphincter muscle is not interfered with. If the ends, and not the sides, of the muscle are sewed together the anus will not be reduced, for the flap is more than ample to accommodate the full-dilating capacity of the sphincter. The anus will not be strictured unless your technique is faulty.

Dr. Ochsner says that the patients can get along very well by being put in a bath every day for a number of days. In reply I will state that such laborious treatment and nursing is entirely dispensed with when fistula in ano is treated in the way I have suggested; they are well in a week.

Dr. Hall.—What kind of suture do you use?

Dr. Noble.—Silkworm gut for closing the incision made by the removal of fistulous tract, and catgut in the edges of mucosa around anus. I dissect out the fistula completely, as Emmet did some twenty-odd years ago, except I do not cut the muscle.

Dr. Robbins, in discussing the operation for rectovaginal fistula, says that he has done successful perineorrhaphy by the method I have described, and I have reports from many other surgeons saying the same thing, showing the efficacy of the rectal flap. Now I carry the principle a little farther, hasten the recovery of the patient, and repair injuries on the vaginal side by flap-making and excision of fistulous opening.

TREATMENT OF DIFFUSE SUPPURATIVE PERITONITIS.

By Stuart McGuire, M.D.,
Richmond.

In studying the subject of suppurative peritonitis, it soon becomes apparent that the differences in the views of various authors with reference to certain types of the disease are due to a failure to adopt the same classification, and to lack of a clear conception of what is meant by the terms employed. We read of septic peritonitis, local suppurative peritonitis general suppurative peritonitis, and diffuse suppurative peritonitis. The term *septic peritonitis* should be employed to designate those cases in which the pyogenic infection is so acute and virulent that the patient dies before sufficient time has elapsed for pus to form.

The term *local suppurative peritonitis* should be employed to indicate those in which, owing to the character of infection, pus develops slowly and nature has time to form adhesions which confine it to a limited portion of the peritoneal cavity.

The term *diffuse suppurative peritonitis* should be reserved to designate the condition in which the infection is less virulent than in septic peritonitis, but more acute than in local suppurative peritonitis, where there is time for pus to form but not time for nature to wall it in by adhesions, and, as a consequence, pus is free in the peritoneal cavity.

The term *general suppurative peritonitis* should be discarded. It was originally used in contradistinction to local suppurative peritonitis, and while its meaning should have

been apparent, it has been misconstrued and given cause for much discussion. The term was never intended to mean that the whole peritoneal surface was involved. The word "general" was used to indicate that the pus was free, in contrast with the word "local" where it was confined. To avoid recurrence of unprofitable argument and the statement by some that no patient with general suppurative peritonitis ever recovered, and the reply by others that, as the term was employed, no patient ever lived long enough to develop it, it is to be hoped that the title, general suppurative peritonitis, will be dropped from surgical nomenclature, and diffuse suppurative peritonitis substituted for it.

The confusion alluded to in the classification of peritonitis is responsible for the condition which existed ten years ago when Abbe, McBurney, Finney, and others were reporting numerous successful operations for general suppurative peritonitis, while, at the same time, Senn declared that he had opened, drained, and washed out the general peritoneal cavity in many cases of septic peritonitis without a single successful result; Weir, that he had never been able to save a patient with general suppurative peritonitis, and had never seen one saved; and Granvin that, until recently, he had expected death after general purulent peritonitis, and was not at all ashamed of his mortality rate of 100 per cent. At this period and for some years afterward the accepted method of treatment was incision and correction of the focus of infection; evisceration, irrigation, and sponging; counterincisions through the loins, and the insertion of multiple drains. The result was a mortality of about 80 per cent.

The present generally accepted method of treatment was not adopted empirically, but was the result of deductions from scientific observations. Its essential features consist of Fowler's position and Murphy's proctoclysis; hence it may properly be called the Fowler-Murphy treatment. In justice to others, however, the following history of the evolution of the method is given:

Muscatello demonstrated that the peritoneum of the upper abdomen, or diaphragmatic region, possesses much greater and more rapid absorptive power than the peritoneum of the lower abdomen or pelvic region.

Clarke saw the possibilities of postural drainage and advised elevating the foot of the patient's bed, thus throwing fluid by gravity to the surface, which would most rapidly absorb it.

Fowler said that the principle of postural drainage was correct, but its application was wrong; that the fluid should not to be drained into the patient, but out of him. He advised elevating the head of the bed to allow the fluid to gravitate from the diaphragm, where it would be absorbed, to the pelvis, where it would be collected until removed by a drain.

Bond demonstrated that particles of indigocarmine placed inside the anus would be carried upward by what he termed "reverse mucous currents."

Cannon showed that, except during defecation, antiperistalsis was the normal movement in the large intestine, and that, owing to this fact, liquid feces are carried back into the cecum, where the watery element is absorbed.

Murphy suggested utilizing the foregoing observation in the treatment of suppurative peritonitis, by injecting saline solution slowly into the rectum, depending on reverse peristalsis to carry it to the cecum, where it would be absorbed. He reasoned that, owing to the patient being unable to take as much water as was being eliminated, he became dehydrated and the empty vessels of the peritoneum rapidly absorbed any fluid the cavity contained. If, by introducing a large quantity of fluid into the circulation, the vessels could be overfilled, then the peritoneum would be changed from an absorbing surface to a secreting surface, and in place of toxic fluids going into the circulation, there would be a flow of cleansing serum into the peritoneal cavity.

The practical steps of the Fowler-Murphy method are as follows: Open the abdomen over the seat of the primary

focus of infection and correct the trouble whatever it may be, so as to prevent the admission of further poison. Make a second short incision immediately above the pubes, and insert a large rubber drain to the bottom of the pelvis. The work should be rapid, with as little manipulation of the viscera as possible, and no effort should be made to remove pus by sponging or irrigation.

Place the patient in bed in an exaggerated Fowler's position; give saline solution by continuous low-pressure rectal irrigation; administer morphine in small doses for pain; spartine in large doses as a general stimulant and prophylactic against suppression of urine. Purgatives should not be employed, but bowel action secured by the use of enemata. If there is much nausea or vomiting the stomach should be thoroughly irrigated, and no food should be given until the patient can retain and assimilate it.

By the adoption of the method outlined, I have seen a great change in my mortality. A recent analysis of the last 500 cases of appendicitis operated on in my private hospital, gives a record of 24 patients with diffuse suppurative peritonitis. The first 6 were treated by the old method of irrigation and multiple drainage, with 5 deaths. The last 18 were treated by the above method, with but 1 death.

Coffey has demonstrated that there are three cavities or basins of the peritoneum to be drained: the right and left flank, separated from each other by the spinal column, and the pelvis, separated from the flanks by the psoas muscle. When the body is horizontal each flank holds more fluid and is deeper than the pelvis. The bottom of the flank cavity is four inches below the top of the divide made by the psoas muscle; hence, theoretically, a patient's body must be elevated to an angle of 50 degrees to permit gravity drainage of the flanks. I have found great difficulty in maintaining a patient in this position, and recently, in visiting various hospitals, I have always inquired what method or apparatus was employed in managing such cases.

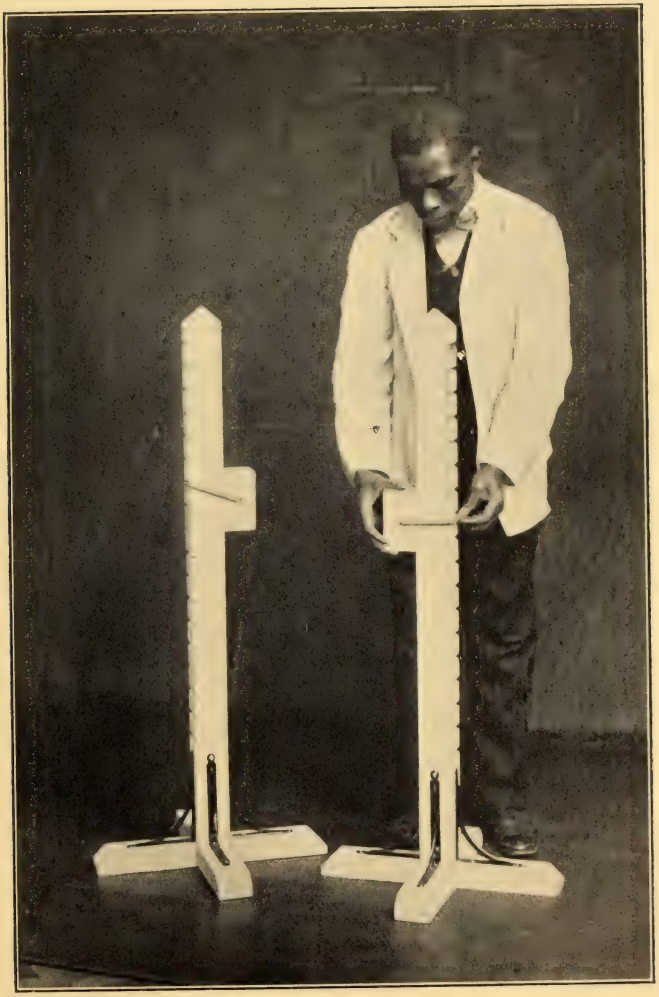


FIG. 1.—Bed elevators.

FIG. 2.—Bed seat.

Fig. 3.—Bed in moderate elevation.

I have found two principles in practice: angulation of the patient, and angulation of the bed. The first is effected by keeping the bed horizontal and elevating the patient's body by means of a shoulder rest; the second by elevating the head of the bed and allowing the patient to lie flat on the inclined mattress. As one method must be superior to the other, I have given their relative merits considerable thought. The advantage claimed for the "semisitting position" over "bed-elevation" is that it gives better drainage. This I do not believe is true, because, as I will try to show, it is impossible to maintain a patient in the proper position on a shoulder rest, while it is an easy matter to prevent his slipping on an inclined mattress, no matter what the elevation.

The disadvantages of the semisitting position are, that it makes it difficult for the nurse to properly place the bedpan; that it is unnatural and subjects the patient to mental and muscular tension; and that he will slip down when relaxed by weakness or sleep, so that his body will bend at the costal arch and his abdomen will be on a plane parallel with the surface of the bed. To prevent the tendency to assume this false position, some surgeons use axillary straps attached to the shoulder rest; some a double inclined plane to support the legs; and others go so far as to elevate the foot of the bed. None of these methods, however, satisfactorily correct the trouble.

The advantages of elevating the head of the bed are, that the mattress may be put at any angle; that the patient lies upon a flat surface, often unconscious of his position, and that he is completely relaxed and easily nursed. The difficulty experienced in managing this position has been to get a simple device for raising or lowering the head of the bed, and to devise a means to prevent the patient from sliding down the incline. Blocks, boxes, and tables have been used for the first; and pillows, hammocks, and swings placed beneath the buttocks and attached to the head of the bed for the second.

I herewith present to the Association a model and pho-

tographs of a simple and cheap apparatus which I have employed for more than a year to accomplish both of the desired ends. The bed elevator consists of a wooden base and upright piece. There are a number of notches on the side of the upright, into which fits an iron link, which supports a block to receive the leg of the bed. The link, when horizontal, slips up or down, but when oblique fits into a notch, just as does the lock of an ordinary needleholder.

The bed seat consists of a board which, either bare or padded with a pillow, makes a shelf on which the patient sits. A wooden shaft projects downward and passes through a second board which rests against the foot piece of the bed. In the shaft are a number of holes, and a peg placed in one of them will prevent the shaft from passing through the bottom board, and thus transfer the weight of the patient to the foot of the bed.

The advantages of the bed seat over a hammock or swing are its rigidity and consequent sense of security given the patient; the ease with which it can be removed and replaced by the nurse when it is found necessary to do so; and also the fact that there are no straps or ropes on either side of the patient's head or body to embarrass the nurse or alarm the relatives. Both of the devices described can be made by any carpenter at the cost of one or two dollars, and will securely maintain the patient at any angle, for any time, without discomfort.

DISCUSSION.

Dr. Charles R. Robins, of Richmond.—I merely want to add to what Dr. McGuire has so well brought out, that the progress that has been made in the treatment of diffuse peritonitis has been almost entirely contributed by members of the Southern Surgical and Gynecological Association. The first departure from the old recognized methods of treating this condition was made by Dr. Geo. S. Brown in a paper presented by him at the Atlanta meeting of this

Association, wherein he took issue with the old method of treatment by purgation in cases of peritonitis. The next valuable contribution to the treatment of this condition was made by Dr. Ochsner in his starvation treatment, by which he limited peristalsis of the intestines by that means. Then we have Murphy's further contributions and those of his associates, and I do not know of anything that has contributed to the saving of as many lives as this recent departure in our treatment of diffuse peritonitis, and the treatment outlined by Dr. McGuire is, I believe, what is now universally accepted.

Dr. I. S. Stone, of Washington, D. C.—I am delighted to have the opportunity to say something in regard to this subject, and I want the Association to feel that it is to be congratulated that a number of its members have brought about this new treatment. I do not mean to say that Dr. Brown is the originator of the idea, but he gave me my first real impression which has gone through my own work.

In regard to the paper of Dr. McGuire, I do not see how anyone can fail to congratulate him on such a record as he has presented—18 cases of diffuse peritonitis, with only 1 death. So far as I know, that record challenges the attention not only of the members of this Association, but of operative surgery everywhere. I believe that he has conscientiously reported his work; I believe that he has laid out properly the dividing line between diffuse peritonitis and so-called general peritonitis. We all know how common it was to open the abdomen, and if we saw a localized peritonitis from abscess, to come to the conclusion that there was universal peritonitis. That was a common mistake, and there were men who read papers at that time, who gave us the treatment they adopted, with a large number of recoveries from cases of universal peritonitis. I have always contended that a case of universal peritonitis, as Dr. McGuire intimated, meant death. I think a patient is about as surely to die with the entire peritoneum involved as though the entire lung surface is involved. I see very little difference.

As to the treatment, I am really feeling happy that the old days of direct medication, from croton oil down to the simple little dose of calomel, have gone. I feel absolutely sure that from now on we will hear very little about purgation, and that Dr. McGuire will never return to purgation in the treat-

ment of any of these cases. He has the unqualified support of all other men, and we are going to have large numbers of these cases reported that have been cured without the dangerous purgation method.

One word, as a matter of caution, as to the position for drainage. It seems to me, not having used the Fowler method very frequently, that in nearly every case intra-abdominal pressure will do the work if we give exit in any locality where pus collection has taken place or can take place. If pus is found in the neighborhood of the diaphragm, it ought to be mopped out or drainage provided, and so it seems unnecessary to elevate a weak patient in the manner described by Dr. McGuire.

Dr. George S. Brown, of Birmingham, Ala.—I just want to say, with reference to the paper I read at the Atlanta meeting of the Association five or six years ago, at that time a good many seemed to have a mistaken idea as to the principles of cure involved in the treatment of cases of peritonitis. The whole profession, at that time, seemed to have been imbued with the idea of combating paralysis of the bowel. My contention was that paralysis of the bowel was a natural condition and that only Nature could cure peritonitis; that when the serosa was inflamed it was Nature's method to paralyze the bowel underneath the serosa, and in reality combating overdistention, which was caused by the presence of food; if we could get paralysis of the bowel, when empty, it was the thing to be desired, and when we gave a purgative in our hysterical effort to overcome this paralysis, it merely set in motion the active portion of the bowel; so that when the food or purgative current got down to the paralyzed portion, it could not go through. Nothing can go through any distance of bowel without peristaltic movements. It will go to the paralyzed portion, and the reverse current will come back, which will result in regurgitation, which is the cause of death after operations for appendicitis. The idea that I contended for was to withhold all purgatives and give opium. If the bowel is full of material it distends, and if that continues long enough you have overdistention and paralysis of the abdominal muscles. It is a good idea to splint the abdominal muscles. Nature tries to splint the muscles by stiffening them.

I contended that the proper treatment of peritonitis was to respect and further this tendency of Nature to keep the bowel

empty and quiet; that to splint the bowel with opium after the advice of the old doctors of the past generation was scientifically sound and that the abdominal muscles should also be fortified by the use of a tight abdominal binder. I reported 12 cases of diffuse peritonitis with 9 recoveries in that paper, but the few who discussed it did so only to protest that the principle was wrong and that the bowels should not be allowed to stay quiet. A year after this Ochsner recommended the quiet treatment without operation for the desperate cases, and then Murphy adopted the same after-operation with the addition of the Fowler position and the slow saline enema, all of which, it is to be hoped, will finally do away with the frantic efforts to force the bowels to move, which were once so popular and so fatal.

Dr. McGuire (closing).—The Fowler-Murphy method of treating diffuse suppurative peritonitis is universally known and practically generally accepted. The object of my paper was to point out the relative merits of the semisitting position and bed elevation. At first I employed the semisitting position, tried to find some device or expedient to prevent the patient from slipping in bed, but failed. I thought of putting the patient in a Morris chair instead of in bed, but was deterred from so doing for two reasons: (1) Because it was difficult to nurse the patient in a chair, and (2) on account of the possibility of sentimental objections on the part of the family. These patients are desperately ill, and if one of them should die in the chair and it became known throughout the community that patients in a certain hospital are not put to bed, but are put in chairs, it would reflect injuriously on that institution. Therefore I gave up the semisitting position and adopted bed elevation. The simple apparatus which I have exhibited to you makes the method very satisfactory. To show that not much attention had been given to working out the details of the treatment, I will state that yesterday, in going through the Touro Infirmary, that magnificent new hospital, I found a patient in bed elevation, the legs of the bed being in two chairs and the patient in a bunch at the foot of the bed for lack of an apparatus similar to the one I have shown you.

HARELIP AND CLEFT PALATE.

By Alex. Hugh Ferguson, M.D.,
Chicago.

APHORISMS.

1. A harelip operation is a minor operation.

2. A cleft-palate operation is a major operation.

3. The two operations (1 and 2) should seldom be performed at one sitting.

4. The younger the subject the graver the operation.

5. Operations on the bones are more severe than those on the soft tissues of the palate. Brophy's operation (crushing the two maxillæ together) is the most major operation ever devised for cleft palate.

6. In extensive clefts in infants the closing of the defect should not be done at one sitting.

7. No tissue should ever be removed from the edges of a cleft palate, and seldom from a harelip.

8. All defects should be repaired before the child begins to talk.

9. The result is best when the operation is done at a very early age.

10. Never guarantee that nasal intonation will be prevented or cured.

11. Asepsis and antisepsis must be aimed at even in mouth operations.

12. Chloroform is the proper anesthetic, and it should be

given interruptedly, the surgeon and the anesthetizer working catch as catch can. This is safest for the baby.

13. Any plastic work that offers a chance of success is justifiable.

14. Mucoperiosteal flaps eventually produce bone.

INSTRUMENTS.

1. Knives:
   (*a*) Small narrow blade, slightly curved.
   (*b*) Small narrow blade, straight.
   (*c*) Strong, short, stout unbendable blade.
   A tenotome may serve all purposes.
2. Scissors:
   (*a*) Strong, straight, sharp pointed (six inch).
   (*b*) Curved (six inch).
3. Mouth gag:
   Ferguson's. Need not always be used.
4. Needles:
   (*a*) Bulldog (Murphy's).
   (*b*) Strong cervix, straight and curved.
   (*c*) Large and powerful to pierce through the alveolar process.
5. Needle-holder:
   Anyone that holds firmly and turns in a small circle.
6. Periosteal elevators:
   (*a*) Angular (Macewen).
   (*b*) Straight (Ferguson).
   (*c*) Hoes (Brophy's), three sizes.
7. Suture material:
   (*a*) Linen thread.
   (*b*) Silk thread.
   (*c*) Silkworm gut.
   (*d*) Horsehair.
   (*e*) Wire, dentists; or silver, or aluminum bronze.

8. Forceps:
   (*a*) Artery (Halsted's small, straight, and curved).
   (*b*) Tissue and packing (dentists).
   (*c*) Bone (small).
9. Osteotome:
   Two sizes.
10. Hammer.
11. Lead plates. Lead buttons. Lead shot, perforated

INSTRUMENTS IN RESERVE.

1. Small hooks:
   (*a*) Sharp.
   (*b*) Blunt.
2. Needles:
   (*a*) Cleft-palate needle; tubular.
   (*b*) Durham's double curve.
   (*c*) Brophy's needles.
3. Tracheotomy tubes.
4. Adenoid instruments.
5. Tonsilotome.

HARELIP.

Clinical Varieties.

1. Unilateral defect:
   (*a*) Beneath left nostril (most common).
   (*b*) Beneath right nostril.
2. Bilateral defect:
   Beneath both nostrils, as in double harelip and cleft palate.
3. Median defect:
   Beneath the nasal septum (very rare).
4. Complicated with cleft palate; single and double.

In extent these defects may be present from a mere notch to a complete division of the lip, extending occasionally to the posterior border to the os incisivum, where it touches the intermaxillary suture.

5. Lateral defects:

Fissure, extending up to the eye, etc., need only be mentioned as a complication.

Functional Disturbances.

There is inability to suck the breast with ease and satisfaction—even a large rubber nipple is managed with difficulty. In complete harelip the function of the orbicularis oris muscle is often totally lost to the upper lip, and, consequently, the normal movements of the lip are incomplete and aimless.

Time to Operate.

In uncomplicated cases of harelip, no matter whether the defect is unilateral, bilateral, or median, the operation should be performed soon after birth, on the same day, if possible. The deformity is unsightly, and parents usually endeavor to screen the baby from view until the defect is remedied. The impaired prehensile powers of the infant interfere with its taking nourishment properly, either naturally or artificially, and too often lead to malnutrition and non-development. When in the charge of a trained nurse, even a feeble infant, one with almost no vitality, is not infrequently made to gain in strength and in weight within two or three weeks so as to make an operation possible. While it is essential to remedy the defect as early as it can be done, I must admit that the danger to life is less at the end of two or three weeks than two or three days after birth. It is not exercising good judgment to operate on a case of harelip when dentition is causing disturbances. Under such conditions it will do no harm to defer operation until after the eruption of the teeth.

In cases of harelip complicated by cleft palate, either

single or double, the time for repairing the lip depends on the degree and the kind of bone deformity present. Surgeons are not in accord on this point. My own practice is to restore the normal shape of the alveolar processes first, and at the end of a week to operate on the lip. The operation on the cleft palate is postponed until a more suitable time (usually three weeks), depending on the local and constitutional conditions present. I find that when the lip is sutured over a premaxilla that was wired to the two superior maxillæ and in the cleft between them a week previously, great strength and protection is given the bony framework, and the tendency of the premaxilla to become loosened is prevented.

Principles Involved.

1. Denudation.
2. Coaptation.
3. Retention.
4. Conformation.
5. Surgical cleanliness.

The freshening of the edges of the cleft must be done in such a manner as not to remove any tissue, and at the same time to leave very broad, raw surfaces for coaptation. This is done best by making flaps from the edges of the cleft, swinging them backward, and then coapting them. The economy of tissue is advisable in all procedures done to remedy congenital defects. The broader the raw surfaces for coaptation, the more certainly will primary union occur. Coaptation should be perfect, and retention by sutures accurate and without tension. The formation of a normal upper lip, as to the length and thickness, must be aimed at, and uniformity in size and shape of the nostrils should be secured. It is only occasionally that the conformation of the lip is so perfect after an operation that the repair of a harelip is even suggested. The surgeon should make every effort, therefore, to obliterate the deformity completely.

While absolute surgical cleanliness cannot be attained in operations on the lip, the results are best when asepsis and antisepsis are carried out rigidly.

Fenger's Operation for Harelip.

The late Dr. Christian Fenger, of Chicago, read a paper at the Forty-second Annual Meeting of the American Medical Association, at Washington, D. C., on "A New Operation for Harelip" which was published in the *Journal of the American Medical Association*, August, 1891. It is to prevent "the good is oft interred with the bones" that I now draw the attention of the profession to this excellent operation, the principles of which I carry out in my practice. These are: (1) The removal of no tissue; (2) the approximation of wider raw surfaces than the older operations provided; (3) the application of three rows of sutures: (*a*) sutures of the skin, (*b*) tension sutures, and (*c*) sutures of the mucous membrane.

Dr. Fenger stated: "About five years ago I was led to consider this question in a case of double harelip with rather defective lateral portions, in which I operated after the old method, and suppuration with consequent non-union took place. At the next attempt at union the increased defect of tissue made union more difficult than at the first operation. I therefore concluded to operate in my next case without the removal of any tissue, so as to have, at least, not lost anything in this respect if suppuration and non-union should make one or more later operations necessary. When I commenced to operate in this way I found it necessary to apply a separate row of sutures to the prolabium before bringing the edges of the skin together, thus closing the wound toward the mouth, and I soon found this to be a preventive against infection." This is the simple story of the origin of Fenger's operation.

The incision in both single and double cases ran at the junction of the skin and mucous membrane, which simulates, in purpose, the flap-splitting operation of Lawson Tait on a

lacerated perineum. The two flaps are made to turn posteriorly, and coaptation of the raw surfaces is accomplished by means of retention and skin sutures (Figs. 1 and 2).

Dr. Fenger used silk for all the sutures. Horsehair is preferable for the skin and retention sutures, two hairs being used for the latter in each suture. In addition to these sutures, Fenger employed adhesive plaster, extending from ear to ear over a collodion dressing, to relieve tension. If there is the slightest doubt about the relief of the tension, it is best to separate the lip from its attachments on each side until there is no tension whatever on the sutures. I do this by thrusting a sharp periosteal elevator or a pair of scissors through a small incision under the lip close to the gum and at a convenient distance from the other wounds, and forcibly and broadly elevate the cheek from the bone.

It is often necessary to liberate the angle of one or both nostrils for the purpose of obtaining symmetry of the face. In addition to this I also employ oxide of zinc adhesive plaster, not over the lip and as follows: Take a strip of plaster one inch wide and about twelve inches long, varying with the size of the patient; stick the centre of the strip beneath the chin; pull firmly on both ends; allow the plaster to adhere to both cheeks well back, and then cross the plaster over the nose to the forehead. Where it passes over each eye, here roll the plaster on itself into a cord. This manner of applying adhesive plaster prevents tension on the stitches, even when the child is crying. The line of incision should never be sealed with either collodion or plaster.

Nostril. It is absolutely necessary in these cases of marked deformity to do an osteotomy on the side opposite to the cleft in order to remedy the deformity. To make the deficient nostril of the same size as its fellow, it is a good plan to insert into the nostril a sound of the size of the normal naris, and suture the nostril over this. When it is found that the cartilage of the nares or ala of the nose is contorted, it is necessary to do multiple submucous sections of the cartilage, and plug

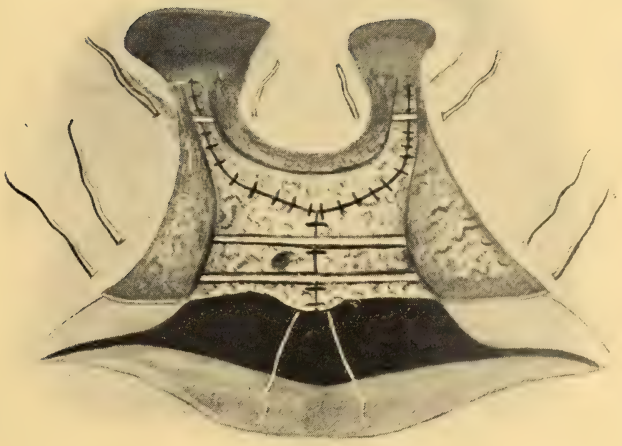


FIG. 1.—Author's harelip operation, showing inner sutures and retention sutures in place; skin sutures ready for tying.

FIG. 2.—Author's harelip operation; all sutures tied and operation completed.

the nostril with medicated gauze wrapped around a section of a soft rubber catheter. This is left in place until the cartilage has united or until the contour of the nose is assured. In some cases I have found it necessary to separate the nasal septum at its base and shift it to the desired side. I wish to emphasize the importance of the restoration of the bony framework by an osteotomy. That is the crux of the entire operation on the nostril.

CLEFT PALATE.

Clinical Varieties.

1. Incomplete:
   - (*a*) Bifid uvula.
   - (*b*) Bifid soft palate.
   - (*c*) Partial cleft of the posterior border of the hard palate.
   - (*d*) Fissure of the alveolar process and anterior border of the hard palate.
2. Complete:
   - (*a*) Single into one nasal cavity.
   - (*b*) Double into both nasal cavities.
3. Complicated with harelip; single and double.
   - (*a*) Os incisivum and prolabium attached to one or other superior maxilla and the defect beneath one nostril.
   - (*b*) Os incisivum (intermaxillary bones) and prolabium attached to the tip of the nose.
   - (*c*) Various degress of harelip on one or both sides.

Functional Disturbances. Although mastication is interfered with more or less, the chief disturbance is the imperfect deglutition. The velum palati is deficient, and during the act of swallowing, it fails to close the cleft in the palate, so the food regurgitates into the nostril. Of course the subject of a cleft palate cannot enunciate distinctly, but that is

not the principal disturbance which must be remedied in a case of cleft palate. The constant irritation of the mucous membrane of the nose by the regurgitated food, in time produces a catarrhal condition which, while not serious, is extremely disagreeable to the patient.

Preparation of Patient.

Adenoids, enlarged tonsils, nasal catarrh, bronchitis, malnutrition, etc., should be treated first. The child should be in the best attainable condition, locally and constitutionally, before the operation is advised. The day before the operation a dose of castor oil and a few doses of strychnine should be administered. Irrigating the mouth with antiseptic lotions for several days previously is contra-indicated.

Age.

In my opinion, all operative procedures on cleft palate should be completed before the child begins to talk. The earlier the congenital deformity of the palate is rectified, the less defective will be the speech. In infants a few weeks old, the mouth is small, the tissues are friable, and there is a tendency for the flaps to slough. If the cleft is wider than one-half inch, the complete closure of it is not undertaken at the first sitting, but one or more crowding operations may be done to lessen it (Fig. 3). In this case Langenbeck incisions are made, and gauze is packed firmly into the wounds and beneath the periosteum in such a manner as to crowd the soft structures toward the centre until they touch. When this is done expertly, the gauze will remain in place for a week or more. It is not removed until it begins to loosen, after which a second packing may be inserted, but usually this is not necessary, for the granulation tissue is sufficient to hold the soft structures in their new position.

Three or four weeks should now elapse before operating again. The palate bones are allowed to become covered

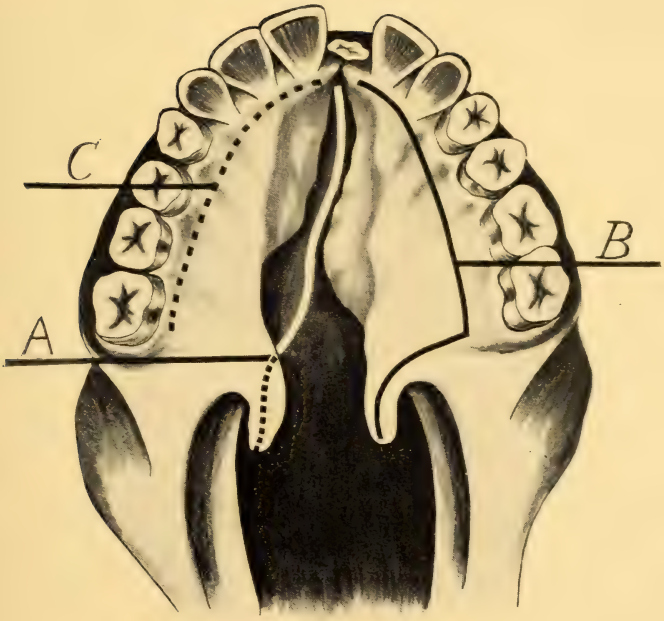


FIG. 3.—Author's cleft-palate operation for selected cases: *A*, line of incision through mucous membrane and periosteum on the nasal septum; *B*, same on the oral aspect of the hard palate on one side; *C*, point to which mucoperiosteum is raised.

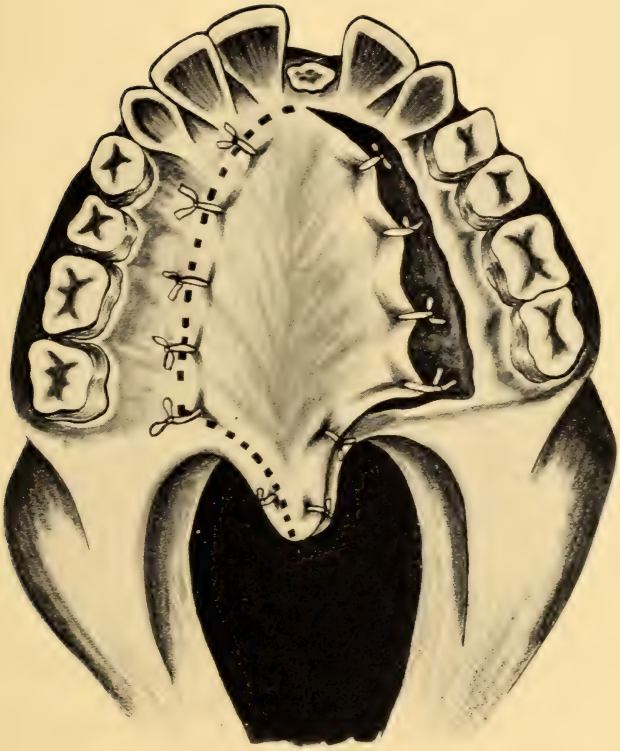


FIG. 4.—Author's cleft-palate operation; imbrication of the muco-periosteal flaps and of flaps of the soft palate.

with firm, fibrous tissue. The crowding procedure is most suitable in a class of cases otherwise very difficult to treat; that is, when segments are horizontal and the roof is like a Norman rather than a Gothic arch. The flaps in this class of cases are shorter, and by the older methods great traction is employed to bring the pared edges in apposition, hence the frequent cause of failure. When the bony edge of each segment is not well covered by mucous membrane, even though the cleft is narrow, a crowding operation is done preparatory to the final closure of the cleft in order to obtain flaps sufficiently thick and well nourished to insure success. The more vertical the slope of the palatal segments, the more favorable the case is for operation by old methods.

Os Incisivum.

The os incisivum, also called the premaxilla and intermaxilla, protrudes in the centre in double harelip, and often to one side, where it is attached, in single harelip, thus raising the nostril on that side far above the level of its fellow. In infants I deal with it before operating on the cleft palate, but in older cases nothing is gained thereby, and I then repair the palate first. The intermaxillary bone is preserved. A V-shaped section (Fig. 5) is removed from the septum subperiosteally through the longitudinal incision, the bone nicely fitted in between the superior maxillæ, and held there by means of a strong wire and lead plates, care being taken to denude the edges on each side so as to obtain bony union, if possible. A couple of small flaps made from the gums answer best. When the deformity is one-sided, it is easier to lower one nostril than to raise the other. This is done by making a supramaxillary osteotomy (Fig. 4). It is usually necessary to remove the V-shaped section from the septum in order to obtain uniformity of the bony framework. In the development of the child, the union of these bones naturally takes place from before backward, so that by repairing the harelip

and waiting a few months the alveolar cleft is very much lessened.

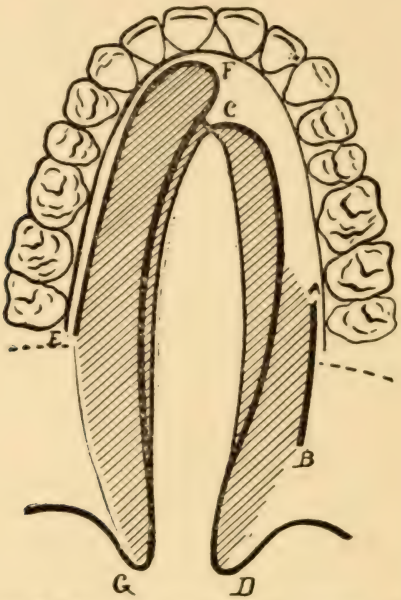


FIG. 5.—Davies-Colley operation for cleft palate. *A B*, incision for cutting tensor palati muscle, *C D*, incision for mucoperiosteal flap; *E F G*, incision for two mucoperiosteal flaps.

Ethmovomerine Septum.

The ethmovomerine septum is frequently very deficient or entirely absent. When present it materially facilitates the execution of plastic work in the roof of the mouth, use being made of its mucous membrane.

Uranostaphylorrhaphy.

The operation which I shall describe has been carefully studied and developed practically.[1] It was done on patients extending over a period of eighteen years. In 1889 I performed it successfully on three sisters. In one the defect extended through the soft palate alone, and in the other two

[1] Journal of the American Medical Association, May 19, 1900.

the hard palate was involved, but not the alveolar process. Wrap the child in a sterile sheet with its arms extended along its sides (papoose fashion); fasten a towel wrung out of bichloride solution around the head, or put on a rubber cap; place it on a table with the end of the cushion rolled up as for a pillow; spray the oral and respiratory passages with vaseline; administer chloroform, drop by drop; mop the child's face, mouth, and throat with equal parts of alcohol and water; with a 4 per cent. cocaine solution on cotton, touch the palate and larynx; if secretion is profuse give a hypodermic of atropine, the dose to suit the age of the patient; insert a mouth gag; sit at the end of the operating table, with the patient's head well thrown back (Rose position), and you are ready for work.

The anesthetizer has a difficult task to keep the patient properly under the influence of chloroform, and also to allow the surgeon sufficient time to work. This necessitates a wide range of the degree of narcosis, the patient coming to and going under alternatively, but this fluctuation in the administration of the chloroform is much safer than keeping the patient in a state of surgical anesthesia by spraying the chloroform through the nostril.

Operation.

Formation of Flaps. With a slender slightly curved, narrow-bladed knife, cut through the mucous membrane of the mouth about one-sixteenth of an inch from the edge of each segment, and divide all the soft structures to the nasal mucous membrane, but not through it. These two incisions are made the entire length of each segment to the tips of the uvular halves (Fig. 6).

First Row of Sutures.

Insert interrupted sutures of fine silk by passing the needle through the free borders of the flaps from the mucous surface

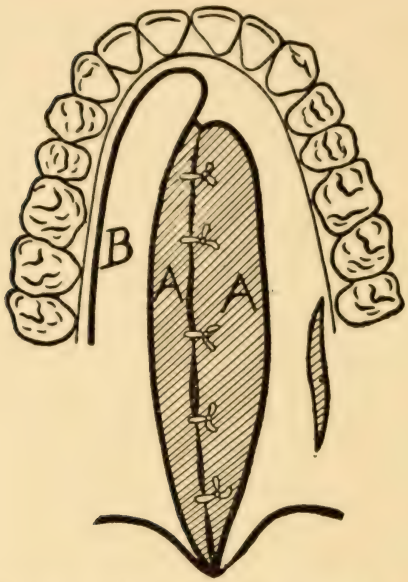


FIG. 6.—Davies-Colley cleft-palate operation: *A A*, two flaps of hard and soft palate; *B*, tongue-like flap.

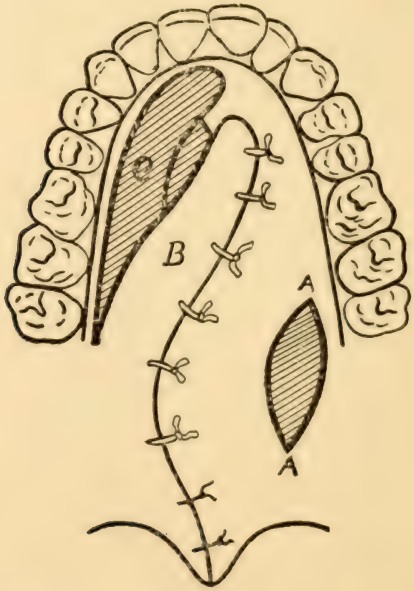


FIG 7.—Davies-Colley cleft-palate operation: *A A*, relaxation incision; *B*, tongue-like flaps sutured across the roof of the mouth; *C*, raw surface.

to the raw surface, and then from the raw surface to the mucous membrane. Tie the sutures as you proceed (Figs. 6 and 7).

Second Row of Sutures.

Take the needle and needle-holder and insert a row of interrupted stitches or horsehair on the buccal surface of the palate from the tip of the uvula forward, and tie them where

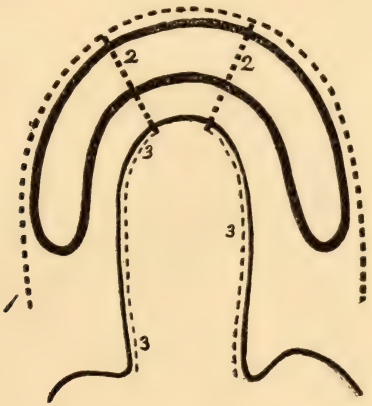


FIG. 8.—Lane's cleft-palate operation· 1, incision along gum margin; 2, incisions from 1 to edge of cleft; 3, incisions along inner free edge of cleft.

apposition is possible without tension. The soft structure of the hard palate cannot usually be brought together until the next step of the operation is completed (Fig. 8).

Mucoperiosteal and Lateral Incisions.

The mucoperiosteal structures are raised from the bones in the following manner: Place the forefinger of the left hand on the hamular process; take a short, strong, slightly curved, narrow-bladed knife, and make a curvilinear incision on one side, beginning just behind the hamular process, cutting down to the bone and extending the incision forward along the alveolar process as far as desired. Prevent hemorrhage

by pressure of the finger and gauze, raise the mucoperiosteal flap rapidly with a strong periosteal elevator from the segment of the hard palate, and immediately pack the wound firmly with iodoform or formalin gauze. Repeat this performance on the opposite side, and then tie the horse-hair stitches not already secured. It will then be seen that the soft structures of the hard and of the soft palate are now beautifully held in apposition without tension on the stitches. The periosteum is freely separated from the palate bone, especially from its position border. In packing the gauze into the wound,

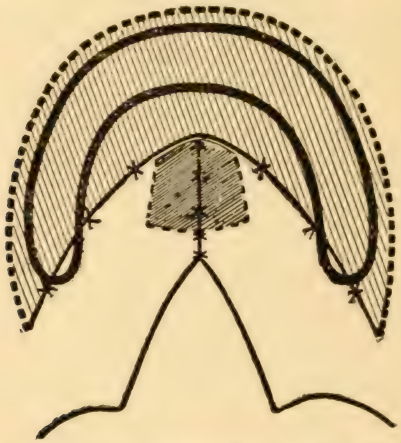


FIG. 9.—Lane's cleft-palate operation. Flaps brought down and approximated to close cleft.

fixation points are obtained by forcing some of it into the bone, also between the teeth and under the mucous membrane. If this is carried out properly the gauze will remain in place for a week, and sometimes longer. It is removed when it becomes loosened, and, occasionally, a third packing may have to be inserted. The packing prevents bleeding, relieves the tension of the palate, and prevents the occurrence of sepsis for the first week after operation.

It will be observed that this is not a flap-splitting, but a flap-formation operation, the flaps carrying with them two

narrow strips of the firm, strong, buccal mucous membrane of the palate. They are held in coaptation by means of sutures inserted on the buccal surface. An ideal protecting roof to the raw surfaces beneath them is afforded; twice the width of denuded tissues for apposition; and the nasal mucopurulent discharge is shed off to either side (Fig. 9).

The cleft in the hard palate must not be wider than one-half inch, but, if it is, a preparatory crowding is done first. The mucous membrane covering the inner edge of each bony segment should be thick and well nourished; if not, the crowding process is resorted to primarily. It is suitable for all clefts in the soft palate.

The results are vastly better than those obtained by the Roux-Warren method. I have had only one primary failure. No tissue is removed. Very broad, raw surfaces are coaptated. The danger from sepsis is minimized by turning the flaps upward as described, and by the gauze packing.

Uranostaphylorrhaphy Suitable for Certain Conditions.[1]

This operation will be found suitable in cases where the roof of the mouth is like a Gothic arch, the palate segments extending upward into the cleft in a more or less oblique manner, and where the cleft extends into one nostril. Two mucoperiosteal flaps are liberated: one from the inner nasal segment and the other from the outer oral segment.

The flaps are then overlapped, bringing the two raw surfaces in contact, and are held in this position by two rows of interrupted silk sutures. The operation is suitable at all ages.

Operation.

Raise the mucoperiosteal flap from the nasal septum and inner segment of the hard palate, and drag it into the mouth with Brophy's hoe-shaped periosteal elevator. This instrument is quite sharp and easily cuts through the mucous

[1] Annals of Surgery, October, 1902.

membrane and periosteum. The formation of this flap is commenced as high in the nose as possible, and it is liberated from above downward until it is hinged by its attachment to the hard palate along the teeth. Extend the incision in the under surface of this segment of the soft palate and uvula so as to cause the completed dissection to form one large flap from the hard and soft palate. The second flap now forms from the outer segment by making an incision along the teeth down to the bone, and with a periosteal elevator detach a mucoperiosteal flap until it is hinged by the mucous membrane along the inner border of the bone segment. Then split the soft palate and uvula segment on each side along the anterior surface. The mucous membrane of the first flap faces downward while that of the second flap faces upward, and when coaptated, raw surface to raw surface, the flaps are held in position by two rows of stitches.

The roof of the mouth is thus constructed into a Norman arch. In all cases operated on by this method the speech (if the patient was old enough to talk) was always improved. In order to still further benefit the speech and also with the object in view of discarding or lessening the nasal twang, the patient should either begin to learn another language and forget the primary tongue (Ochsner) or be placed in the charge of a teacher specially suited for the purpose, such as one who instructs deaf and dumb children (Owen).

Davies-Colley's Operation. In 1890, Davies-Colley published his method of treating clefts in the hard palate by means of mucoperiosteal flaps. At a later date (1894) he republished his invention, and extended it to include the cleft in the soft palate. Inasmuch as this excellent method is well known and practised by many surgeons, I shall only give a brief description of it. In Fig. 5, *A B* represents an incision at the junction of the hard and soft palate, close to the last molar tooth, passing to the bone of the hard palate and clear through the soft palate. The mucoperiosteum is raised from the posterior half of the hard palate, and all the soft structures

are crowded inward. It is my practice to pack this wound with iodoform or formalin gauze. This is the incision that cuts the tensor palati muscle on the oral and the levator palati on the nasal aspect of the palate. I do not deem it necessary to cut the levator muscle, only in exceptional cases.

Fig. 5, *C D*, is the line of incision on the same side, situated about one-quarter of an inch from the margin of the cleft, and extending the full length of the cleft, but as the knife reaches the soft palate, the cut is made to converge to the edge of the cleft, taking care not to penetrate the soft palate while splitting it. The mucoperiosteum internal to this incision is forced from the bone by means of a periosteal elevator until it is left attached by the soft tissue, which covers the margin of the cleft. When the soft tissues over the border of the cleft in the hard palate are very thin, rather than penetrate through them, I prefer to use a chisel along the margin of the hard palate, cutting through the bone close to the thin margin, thus allowing a strip of bone to go with the flap. Fig. 5, *E F G*, in one sweep marks out the large flap that is to be raised from the bone to bridge the cleft, and the mucoperiosteal flap that is to be turned over to meet its fellow, already raised from the opposite side. The next step consists in suturing three flaps in place (Figs. 6 and 7).

This uranostaphylorrhaphy is suitable for wide clefts. It is also applicable to secondary operations. The author does not adopt it in every case. The saving of all tissue and the large extent of raw surface for coaptation are commendable features. The late Mr. Davies-Colley had never known the flap to slough. In 1896 I operated on an infant one month old by this method, and I am sorry to record that the large flap died. The inventor, however, did not employ his method in the case of young children, but I sometimes perform it in the case of infants and with excellent results.

Lane's Operation. In 1905 Mr. W. A. Lane published his mucoperiosteal flap method, similar in principle and application to the flap method published by me three years pre-

viously.[1] The similarity existed in the imbrication of large, mucoperiosteal flaps. In cases of very wide clefts in the newborn, Lane does not hesitate to include in the flaps the mucoperiosteum over the alveolus and the mucous membrane of the cheek. This I have not yet done where it is most applicable, *i. e.*, in infants. In a young man, aged twenty-seven years, I removed decayed teeth from the left upper jaw—all except the incisors. It then occurred to me to bite off the entire alveolar process from which the teeth were removed, with the object of eventually borrowing the tissues from this locality, as Lane recommended in the case of infants. It furnished exactly the flap required to close a very large cleft.

In my opinion, however, any plastic operation on the soft structures, co-extensive with the indications to close the cleft, is better than an operation on the bones. Dr. Lane operates by choice the day after birth. To illustrate his extensive flaps I have taken Figs. 8 and 9 from his work. In this connection he says: "The cleft is a very wide one, and it is impossible to close it by the reflection of flaps in the manner described. An incision is made along the entire outer aspect of the gum along the line indicated by 1. Two are made along the direction of 2, and two others along the free inner margins of the cleft. The flap included between 1 and 2 on either side is turned back, great care being taken of its attachment, which is usually very thin. The flaps comprised between 1, 2, and 3 are raised from before backward, care being taken to avoid any damage to the descending palatine vessels. These flaps are then displaced inward, as in Fig. 9, their opposing margins being sutured together and to the subjacent flap, and, if possible, to the septum also. At a later period the posterior portion of the cleft in the soft palate is closed."

Brophy's Operation. This operation consists in forcing together the two superior maxillæ by means of two stout silver wires, which are passed laterally through and through

[1] Annals of Surgery, October, 1902.

the jaws from one alveolar process to the other, and there fastened to lead plates. The approximation is effected by twisting the wires over the plates. If the bones do not come together easily the malar process is cut through on each side, when it will be found that approximation of the maxillæ is facilitated. The vivification of the edges of the cleft is executed in the usual way, and fine silver wire is inserted to coapt them. It is claimed by Brophy that no tension is put on the soft palate when the sutures are tied. This is true. In cases of harelip and cleft palate Brophy operates on the palate first. My friend, Mr. Edmund Owen,[1] of London, says: "Since becoming more fully acquainted with this method I have cordially adopted it, and, although I realize that its performance is not unattended with increased risk, still I consider the advantages associated with it are so great that the extra risk may be unhesitatingly accepted."

Mr. Owen, then, by way of illustrating the benefits of the operation, relates the case of an infant he operated on by Brophy's method. The infant was three months old, weighed but six and one-half pounds, and had harelip and cleft palate on the right side; the vomer was adherent to the left maxillary process. The operation was executed secundem artem, and a closure of the cleft was eventually obtained. It was necessary to divide the malar processes à la Brophy before the palatine processes could be brought together.

"The infant was very ill for two or three days and the union of the sutured borders was only partial, but the front of the cleft was solidly closed and a useful bridge held securely at the junction of the hard and soft palate. Subsequently, by the aid of three small supplementary operations, the cleft was entirely closed with the exception of a spot of the size of a *rabbit show*, about one-quarter of the way along the line of suturing. This was closed subsequently. The harelip operation was performed three months later."

I mention these facts to show that such an expert surgeon

[1] Medical Monograph Series, 1904, No. 4, p. 46.

as Mr. Owen performed no less than six operations to secure perfect closure of unilateral harelip and cleft palate. This is the class of cases in which I proceed as follows: (1) Osteotomy; (2) harelip operation in one week's time; (3) uranostaphylorrhaphy. The whole work is completed within two months after the child is born.

There is no doubt but that Brophy's operation contracts the palate and brings the teeth of the upper jaw abnormally in contact with those of the lower jaw. Brophy argues that if normal contact does not occur, the arch can be expanded and the deformity rectified. While in Brophy's operation the palatine attachments of the tensor palati and the levator palati are not interfered with in the least, still it has to be shown that the intonation is better than that obtained by other plastic operations.

The objections to Brophy's operation are: (1) Shock; (2) sepsis; (3) contraction of the palate and irregular contact of the teeth; (4) its limited application. It is only of use in infants under three months of age. I quite agree with Jacobson in the assertion that: "It is clear, from common sense and Mr. Owen's case, that shock and a low form of septicemia will be the chief dangers." In my work I lost two patients operated on by the Brophy method.

Mr. James Berry states that of the 11 cases of which he had heard of in his country, 5 died. Several surgeons favor the operation and report good results, with a low mortality. The claim made by Brophy that shock is less severe in the case of infants operated on soon after birth than at a later period in life, must be explained not on a scientific or practical basis, but on the ground of his enthusiasm. How often have we seen the upper maxillæ very severely fractured and even separated from the other bones by violence, such as a kick from a horse, and not followed by any marked shock? Practical experience bears out two assertions: That infants do not bear major operations well, and that the younger the person the greater the shock after traumatism.

Causes of Failure.

It is true that vomiting, tearing through of the stitches, hemorrhage, the infant putting the fingers into its mouth, swallowing solid food, and various diseases, cause failures; but the chief causes are:

1. Tension.
2. Unskilfulness and devitalizing the tissues by bruising, etc.
3. Unsuitable local and constitutional conditions.
4. Failure to select a suitable operation for the congenital deficiency in the case at hand.
5. Poor nursing.

When the soft palate is pared and sutured, as in the Roux (1819)-Warren (1820) staphylorrhaphy, it is put on great tension, and failures were common on account of the stitches tearing through. Sir William Fergusson (1854) made the first marked improvement. He recognized that many of the failures were due to tension caused by the palatine muscles. To relieve this tension he divided the levator palati, palatopharyngei, and palatoglossi muscles on both sides. This improvement was soon adopted by other surgeons.

In 1860, Dr. Agnew, of Philadelphia, recognized that the tension of the soft palate was in great measure due to the contraction of the tensor palati muscles, and these he cut close to the hamular process of the sphenoid bone by an anterior incision, and thereby obtained the required relaxation. Pollock, of London, England, carried out a similar procedure.

In Fergusson's uranostaphylorrhaphy the tension was relieved by making lateral cuts. If Fergusson had only packed these wounds firmly with iodoform gauze (not then in use) to prevent infection for a week or so, many of the bad results noted would never have occurred. Garretson applied to the jaws a horseshoe-shaped clamp, and with it forced the jaws together by means of a screw. Brophy

relieves this tension in cases of uranostaphylorrhaphy by wires and plates, or, when only a staphylorrhaphy is required, lead plates applied to the soft palate with retention sutures. Langenbeck employed two lateral incisions: one on each side close to the teeth, and encroaching sufficiently on the soft palate to relieve tension when the mucoperiosteum was raised from the bones. Billroth broke the hamular processes and crowded the tendon of the tensor palati midwise. When the cleft in the soft palate is not very wide, I find that two or three sutures of medium-sized silver wire, inserted well beyond the edges, will relieve the tension. The retention sutures must penetrate the entire thickness of the palate. In the overlapping of mucoperiosteal flaps, as in Davies-Colley's, Lane's, and my own operations, no other special provision is generally required. Dr. C. H. Mayo relieves the tension by means of a piece of tape passed around both mucoperiosteal flaps, and fastened there by tying a thread to the overlapped ends of the tape.

There are many surgeons who never try to perform operations on cleft palate. If adenoids are present they must be removed before any attempt is made to close a cleft. The same may be said of diseased tonsils and decayed teeth.

Poor nursing is a fruitful source of failures. As a rule the mother is the worst nurse that can be allowed to take care of the baby, for she is overcome by her sympathy for the patient and knows not the importance of surgical cleanliness.

In a strong patient, when the lips, nose, mouth, and pharynx are so neglected as to become foul, the patient should be put asleep and a general cleaning up performed, with the child in the extra-Rose position. A thorough douching is done from a percolator with a saline solution, and then one of boric acid. The irrigation is followed by drying the parts and applying some feeble antiseptic powder.

DISCUSSION.

Dr. Charles H. Mayo, of Rochester, Minn.—The Association is to be congratulated on having as members Dr. Noble, who has confined his work to a certain limited field, and Dr. Ferguson, who, with his inventive genius, applies it more indiscriminately in general surgery.

There are a few principles which enter into the repair or correction of these deformities of the face, and the reason we get failures or imperfect results is due largely to the manner in which the sutures are placed. All tension sutures that are used in harelip work should be tied on the inside of the mouth. The next thing to remember is that, as a rule, we have more cases in which there is a single cleft, and one side of the nose has a normal blood supply, while the other does not, even after a good operation. If we make the whole front of the face absolutely pliable, so far as nutrition goes, the poor side, or one in which there is imperfect circulation, is going to have an equal chance with the good side. I venture to say that one-half of the poor results from scar, in operations in these cases, are due to the skin-cutting of the tension sutures. I have found that we can bring the parts into apposition and approximate them by horsehair sutures, and obtain very good results.

I do not believe there is a great deal of shock from these operations on infants, as a great many surgeons suppose. In the first six weeks of life the child can stand a good deal in the way of operative procedure. It is not really a bone operation, and one does not need to do a real Brophy operation. With a heavy bone forceps one can crowd the upper edges of the cleft together and mould the parts. They are more cartilaginous than bony. By simply placing gauze in a lion-jawed bone forceps, keep pressing the tissues, slipping it in the mouth over the alveolar edges, you can make the margins overlap with a few tension sutures of either silver wire or silkworm gut, to be left in for ten days and again freshen the borders. It is an easy thing to render the upper jaw perfectly pliable, so that the parts will come together, and repair the lip at the same time in the second operation. Another thing: I believe after three months the Brophy operation is a serious operative procedure, and I think it is serious, so far as the child is concerned, at six weeks, but this would be

the preferable time, in my judgment, for the repair of cleft palate.

Dr. James E. Thompson, of Galveston.—I agree with what Dr. Mayo has said as regards the effect of tension in preventing healing after operations for harelip and cleft palate.

As regards operations on the lip, it is quite possible to get perfect union, but a poor result as regards the appearance.

In order to obtain a perfect lip in all cases, certain principles must be carried out by which the edges of the cleft are always pared in a definite manner. Some few of us may have artistic eyes, but our eyes are not artistic all the time.

It is an impossibility for anyone of us to make the flaps of equal length in every case if we trust to our eyes, and the result is that in a certain number of cases the red line of the lip will not correspond on the right and left sides.

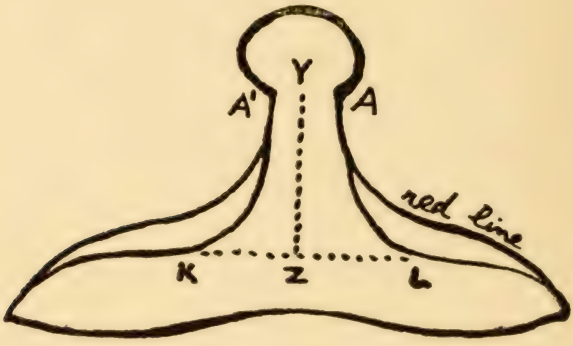


Fig. 1

A perfect apposition of the corresponding parts of the cleft can be obtained by carrying out certain principles, which I have done in the following way with mathematical accuracy. (Demonstration on the blackboard.)

The method employed will be easily understood by a glance at the diagrams.

Fig. 1 represents a case of single harelip, with a complete cleft passing into the nostril. The red line of the lip is shown.

The following points are important: (1) The height to which the red line passes up the edges of the cleft is seldom the same on both sides. (2) The circumference of the flaring nostril, measured from A to A', is invariably the same as that

of the normal nostril. (3) At A and A' the change from the lip to the margin of the nostril is marked by a sharp projection or corner.

A pair of sharp-pointed compasses regulated with a screw is used, and a measurement YZ is taken from the opposed corners A and A' directly downward, of such length that Z would lie on an imaginary line (dotted horizontally) K L which would complete the natural curve of the upper lip.

The points of the compasses are now fixed at this distance apart, and measurements are taken on each side of the cleft (shown in Fig. 2), commencing at A and A' respectively, and passing to B and B'. B and B' are each close to the junction of the skin of the lip and the red line of mucous membrane, and are so placed that A B is equal in length to A' B' and each one is the same length as YZ.

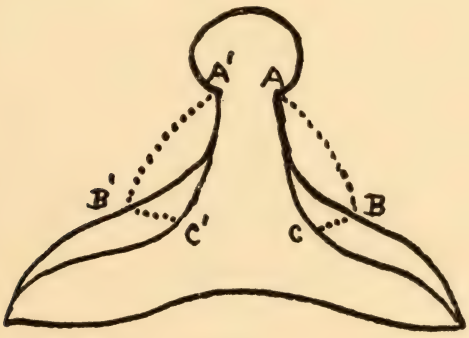


FIG. 2

The points B and B' are fixed permanently by pricking the lip with the point of the compasses.

The compasses are now readjusted and a measurement B C is taken, the point C being on the margin of the line, B C being equal in length to the thickest depth of the visible red mucous surface. Usually, this is measured obliquely in the direction shown in Fig. 2. A similar point C' is taken on the other side of the cleft, and after both points are pricked the sides of the cleft are denuded. A retaining stitch of horse-hair is placed on each side of the lip to the outer side of C and C' respectively, for the purpose of steadying the parts while the edges are being pared.

A narrow-bladed tenotomy knife is introduced at B and

made to cut its way out to A' passing in a slight curve shown in the figure.

Next, the lip is cut along the line $B\,C$, and the tissue outlined by $A\ B\ C$ is removed. The same maneuver is carried out on the opposite side of the cleft, the knife passing along the line $A'\ B'\ C'$. The result of this is that we have two raw surfaces opposed to one another, the corresponding sides of which are equal in length. Thus $A\ B$ is equal to $A'\ B'$, and $B\ C$ is equal to $B'\ C'$.

If A be united to A' and B to B' and C to C', the sides of the wound between these points can be brought into apposition with accuracy and a perfect lip will result, such as is shown diagrammatically in Fig. 3.

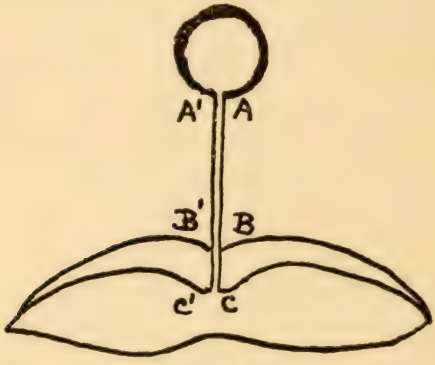


FIG. 3

Figs. 4 and 5 show the same principles applied to the treatment of double harelip where the skin covering the premaxilla is retained.

$C\ D\ E$ represents a triangular flap cut from the central piece of skin (Fig. 4).

C and E are placed on the inner margins of the nostrils. The sides $C\ D$ and $D\ E$ are equal in length to one another, and their length varies according to the size of the central piece of skin. The length must never be greater than $A\ B$, and is usually much less.

Fig. 5 shows the final appearance of the lip when the flaps have been cut and the corresponding sides applied to one another.

A comes in contact with E; A' with C; the point D lies

somewhere along the line *A B; B* is in contact with *B'*, and *C* with *C'*.

Two points must be emphasized:

1. Under no circumstances must the circumference of the flaring nostril be encroached upon. The points *A* and *A'* must always represent the sharp projection or corner previously described.

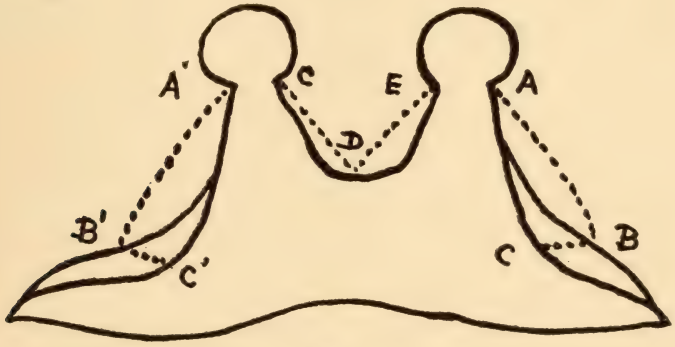


FIG. 4

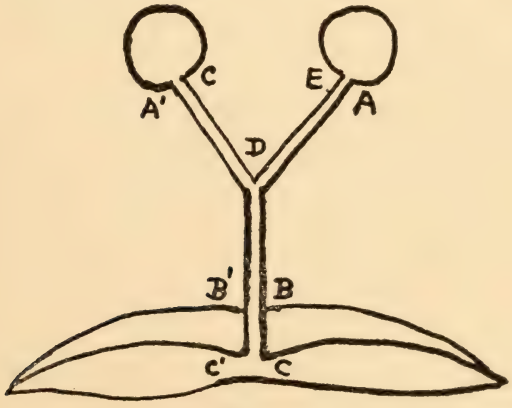


FIG. 5

2. *B* and *B'* must be as close to the red line of the lip as possible, and must always be on the skin (upper) side of this line.

DR. J. SHELTON HORSLEY, of Richmond.—I wish to say one or two words in regard to this excellent paper read by Dr. Ferguson concerning harelip. It seems to me that the

secret of success is the relief of tension, and that is accomplished by free dissection and the proper insertion of sutures. It is impossible to get the parts in accurate approximation unless tension is relieved, and I think a most important point is to dissect free the ala of each nose and the lip on each side well back. I always use a knife. It makes a clean dissection, and lessens tension much more rapidly than anything else can. There is some bleeding, but if the assistant keeps up sponge pressure on one side, while the surgeon is working on the opposite, there is very little blood lost.

Another point is relieving tension by sutures. I have tried various methods. After freely dissecting the lip on each side, an apparatus or adhesive plaster is unnecessary. After free dissection and paring the lips, the first suture should be placed just above the red line of the lips. This may be left long and used as a traction suture, enabling the surgeon to insert the remaining sutures accurately. If the dissection on each side is free, no tension sutures are necessary.

In regard to the dressing, following the teaching of Dr. Wyeth, I do not dress any wound about the face with gauze or anything else except a simple antiseptic dusting powder, because you cannot make a face wound absolutely aseptic, and the gauze acts as a focus for absorbing secretions, so promoting suppuration.

In regard to cleft palate operations there is only one feature I wish to speak of, and that is the anesthetic. One prominent cause of failure in operations for cleft palate is the anesthetic. A good many years ago, when it was the practice to scrub the skin hard with brushes and to use very strong antiseptics, we weakened the resistance of the skin; in other words, an irritated skin cannot overcome germs, and it is well known that the skin cannot be rendered sterile. The same thing applies to the mucous membranes. If you can do away with the irritating effect of the vapor of chloroform or ether on the mucous membrane of the palate, you will do much toward the successful termination of the case. Rectal anesthesia would accomplish this. I have tried rectal anesthesia in one instance, and was gratified at the promptness with which the mucous membrane healed. I followed the method recommended by Cunningham, of Boston, and while the patient was never fully under the ether, the anesthesia was sufficiently profound to enable me to complete the operation satisfactorily.

Dr. Robert T. Morris, of New York City, also discussed Dr. Ferguson's paper, his remarks being accompanied by blackboard diagrams and illustrations.

Dr. Ferguson (closing).—There is a good deal in my paper which you did not hear regarding anesthesia and many other things.

I was particularly interested in Dr. Thompson's description on the blackboard. When you have a harelip and cleft palate, it matters not how you restore the alveolar process, there is a notch in it. By making flaps without losing tissue and turning them in fills up that notch, and flattening of the lip is prevented.

In making nostrils it is well to have the alæ on the same level, but when you have a case of harelip and cleft palate, you cannot get them on the same level without an osteotomy, as represented in Fig. 4.

THE DIAGNOSIS OF EXTRA-UTERINE PREGNANCY.

By H. J. Boldt, M.D.,
New York.

Under the term "Extra-uterine Pregnancy" we include all fecundations which are situated outside the uterine cavity. While anatomically extra-uterine pregnancy may be subdivided into several varieties, from a clinical point of view such differentiation is not essential. *Tubal* pregnancy, however, is the most frequent form of ectopic gestation.

In endeavoring to make the diagnosis of ectopic gestation from objective pelvic symptoms, we must always bear in mind the comparatively delicate structure surrounding an extra-uterine fecundated ovum, and, therefore, avoid a rude manipulation of the pelvic organs, so as not to cause a rupture of the sac. It is especially important to bear this in mind when examining under an anesthetic a patient in whom an ectopic gestation is suspected.

Uninterrupted extra-uterine pregnancy is but rarely recognized, and then usually by mere accident, when operating for other conditions, or when examining a patient for a complaint causing symptoms independent of extra-uterine gestation. I have never palpated a tubal pregnancy prior to the occurrence of symptoms due to the pathological implantation of the ovum, except in one instance—a double tubal gestation. In this case, however, the right tubal gestation did give rise to symptoms, and was diagnosticated. On the opposite side a tubal enlargement was felt, the nature of which was not diagnosticated, but on operation the tubal distention proved to be

due to a tubal pregnancy which had not begun to be interrupted by bleeding within the tube, or by any inflammatory process about the tube. So far as I remember, the distention was limited to the outer two-thirds of the tube, which was freely movable and did not possess the doughy feeling of a pyosalpinx, or the tense elasticity of a hydrosalpinx, which I had supposed to exist on that side.

The symptoms may be divided into subjective and objective. There is no reason why a physician should ever be called upon to see a patient with extra-uterine pregnancy unless she has subjective symptoms pointing to some pelvic disorder.

The omission of menstruation, while of great importance, still is not a constant sign, because sometimes the menstrual period may be delayed by another cause than pregnancy. Sometimes, too, rupture of an impregnated tube may occur prior to the time of an expected menstrual period. Peritoneal irritation, caused by the boring of the growing ovum into the tube wall, eroding the small bloodvessels, preparatory to subsequent rupture, is likely to cause more or less pelvic pain.

When bleeding takes place into the lumen of the tube, owing either to the separation of the ovum from the tube wall in the course of a tubal abortion (the most frequent termination of tubal gestation in my experience), or to erosion of the tube wall to such an extent that a *slight* rupture of the tube takes place, the pains are severe, cramp-like, and intermittent. The symptoms of tubal abortion and of partial rupture are identical, so far as my observation goes, especially if the defect in the tube wall is small. Usually atypical bleeding is present, but in most instances the blood lost is peculiar, almost characteristic, and of a nature very seldom found in other pathological conditions. It is dark, tarry, and of a smeary consistency. I have known such bleeding to continue steadily or at intervals for weeks, especially in cases in which a hematocele had formed.

Sometimes, with the existence of ectopic gestation, menstruation may appear regularly to the day, but then it is usually very scant, so that the patient will have noticed the difference in quantity from previous flows.

If a profuse intraperitoneal hemorrhage suddenly takes place, the patients become very anemic; have a small, weak pulse, and cold, clammy perspiration, yawn, and are apathetic. If not in collapse, they complain of intense pain in the lower abdomen, which soon becomes more general. Usually they refer the beginning of the intense pain to that side of the lower abdomen where the rupture has occurred.

If in the history we can elicit that a decidua has passed, this is important as confirming a suspected extra-uterine gestation. If the physician finds that the membrane has been passed in the form of a closed three-cornered sac with three openings, corresponding to the tubal openings and the opening for the internal os, and that it contains no ovum or a defect for its site; and if, moreover, the decidua is of sufficient thickness to exclude its being menstrual, and if other corroboratory signs of extra-uterine pregnancy are present, the decidua is very certainly due to an ectopic gestation.

The absence in the history of the passing of a decidua does not, however, exclude the presence of ectopic gestation. In the large number of extra-uterine pregnancies that I have seen (nearly three hundred), less than half gave an affirmative history on this point. A decidua may be passed unnoticed, or it may remain in the uterus and eventually be transformed into normal endometrium.

Such subjective symptoms as nausea and vomiting rarely occur when the ovum is implanted outside of the uterus. We may lay it down as a rule that subjective symptoms of importance do not manifest themselves until a process tending toward the *interruption* of the pathological impregnation is under way, and that these symptoms then chiefly consist of the sudden onset of intense intermittent cramp-like pains in the lower abdomen, referred primarily to the side on

which the pregnancy exists. A very frequent symptom observed among my patients was an intense lancinating pain in the lower part of the rectum.

Among the objective symptoms, that of least importance is the presence of colostrum in the breasts, except in persons who have never been pregnant, or have not been pregnant for a number of years, and even then the symptom is of importance only if corroborated by other symptoms. The changes of pregnancy about the genitals are also less marked in ectopic gestation than in intra-uterine pregnancy, although some softening in the consistency of the uterus is almost invariably present, as well as a slight increase in its size. In a few instances, perhaps two or three times, I have seen patients in whom this change also was absent. On the other hand, other inflammatory conditions of the pelvic organs may cause changes in the uterus and in the appearance of the mucous membrane, similar to those of the early stage of ectopic gestation. I have, however, found that patients almost invariably complained of severe pain when the vaginal portion of the cervix was slightly moved forward with the examining finger.

Let us now turn to the palpatory findings in the pelvis in instances of extra-uterine pregnancy. Before discussing them, I would again lay stress upon the great care that is to be exercised in making an examination in all instances where we have the slightest reason to suspect such condition—as we always have when the history includes delayed menstruation, atypical bleeding, and intermittent, cramp-like pains; or, perhaps, the loss at the regular period of a smaller amount of blood than usual, if associated with intermittent pelvic pain at that time or soon afterward. A uterine sound should *never* be used, except, perhaps, under unusually intricate conditions, nor should a traction forceps be used on the uterus; this may also be said of making firm pressure on an existing pelvic mass. Disregard of any of these precautions may lead to the rupture of a fecundated tube; to the rupture of

the sac containing the ovum; or to the rupture of an hematocele, with perhaps fatal hemorrhage; or to a peritonitis with fatal termination. Furthermore, all patients who have been examined under such circumstances should be kept under constant observation for evidence of a subsequent intraperitoneal hemorrhage, unless the opening of the abdomen at once follows the examination.

It has been mentioned that the opportunity to palpate an uninterrupted tubal gestation is very rare. I am aware that the statement not infrequently occurs in literature that such diagnosis was made; if we take the trouble to carefully analyze such cases, it will almost invariably be found that bleeding into the tube had taken place, showing that the process of interruption of the gestation had been begun. The bleeding within the tube causes a distention of the tube, which is well marked, except at its uterine end, where the tube, in the ordinary forms of tubal gestation, retains its normal or nearly normal caliber. It then gives rise to a distinctly palpable tumor of small sausage-shaped outline, and sometimes, if the tube has prolapsed to the floor of the pelvis and is free from peritonitic adhesions, it is possible in women who have a thin abdominal wall to palpate the tube in its thickened part and feel its non-distended parts. The abdominal end of the tube must of course still be free from blood. The tube itself is hard in consistency if the blood has become coagulated. It is mobile, and is usually painless to the touch.

The palpatory finding is changed, however, when the bleeding has become more profuse, as in cases of progressing tubal abortion or of partial tubal perforation. We have then a pelvic hematocele, the blood accumulating in the cul-de-sac of Douglas. The formation of such retro-uterine hematocele causes the tube to be pushed upward, and the summit of the hematocele remains in close proximity with the abdominal end of the tube. If much blood has been accumulated in the pelvis behind the uterus, the pouch of Douglas is pushed

more or less downward and the uterus is dislocated upward and forward by the retro-uterine blood tumor. The bulging of the cul-de-sac and the position of the uterus are influenced by the amount of blood in the pelvic cavity. In small hematoceles the blood does not reach the lateral walls of the pelvis, so that the hematocele, with the uterus, has a certain amount of mobility, making the two, uterus and hematocele, feel as though they were one mass, because the hematocele becomes intimately adherent to the posterior wall of the uterus.

The feeling conveyed by an hematocele to the examining finger depends to some extent upon the duration of its existence. A fresh extravasation of blood feels flaccid and fluctuation is readily detected; but as soon as the blood becomes coagulated the consistency changes and it becomes harder. In nearly all instances there was a difference to be felt in the consistency of the tumor at the floor of the pelvis, some points feeling quite hard, and others softer, depending on the condition of the blood in the retro-uterine tumor.

In considering the topography of an hematocele, we must bear in mind that as a result of previous pelvic inflammation the cul-de-sac may have become obliterated in whole or in part, which would prevent the formation of the usual outlines of the hematocele. I have seen several such cases, and unless one takes all the features into consideration the diagnosis becomes more difficult. Again, in instances of tubal abortion or in partial tubal rupture, when the bleeding takes place slowly, the extravasated blood is located unilaterally, according to the direction of the affected Fallopian tube. The usual site of an hematocele, however, is a little to the side and behind the uterus. I have also seen a few instances in which the fecundated tube was so high up in the pelvis that it could not be palpated, and in these, in the absence of other pathognomonic symptoms of extra-uterine pregnancy, the diagnosis of the ectopic gestation was not made until after the occurrence of complete rupture. The cause of the high position

of the tube was found to be adhesions of the tube high up in the pelvis—in one instance to the vermiform appendix and cecum.

In those patients who have a retroversion with retroflexion of the uterus, and become afflicted with tubal gestation, the impregnated tube lies *anteriorly* to the uterus. Consequently, when such gestation becomes interrupted, the hematocele, if one forms, lies anteriorly to the uterus.

The most frequent palpation findings are from a combination of bleeding into and outside of the tube, which permits us to palpate the distended tube. This is more solid in consistency than the hematocele which has formed in close contact around it. The hematocele is somewhat more elastic than the distended tube. It lies to one or the other side of the uterus.

When an impregnated tube, as the result of an inflammatory process, becomes adherent to the posterior surface of the broad ligament and ruptures on the part which is agglutinated to the broad ligament, the blood is extravasated between the folds of the broad ligament, and forms a hematoma, having a broad contact with the uterus. According to the quantity of blood extravasated, the folds of the broad ligament become more or less distended, even to the pelvic boundaries; and sometimes, in profuse hemorrhages, the blood extravasates beneath the pelvic peritoneum and beneath Douglas' pouch, surrounding the vagina and rectum and passing to the opposite side, thus producing, as soon as the blood becomes firmly coagulated, palpatory findings resembling those of parametritis.

So far, we have considered only the diagnostic features of early extra-uterine pregnancy. After the second half of the gestation period, the diagnosis depends upon our ability to determine the presence of a fetus outside of the uterus, which is, as a rule, not very difficult, unless the fetus is located between the folds of the broad ligament and the woman has thick abdominal walls, or the fetus has been dead for

some time and is not in close contact with the abdominal parietes or the cul-de-sac of Douglas. At this period of gestation the history will also aid us very much, because in nearly all cases, in addition to the symptoms that are present in the early stages of ectopic pregnancy, there are also history symptoms that show that one or more attacks of local or even general peritonitis have occurred.

A pregnancy in the interstitial part of the Fallopian tube causes bulging of the uterine cornu of the invaded side. This bulging, being in an upward direction, necessarily makes the cornu much higher than that on the opposite side, and the adnexus is given off at a much lower plane than that of the impregnated side. In the event of rupture, which nearly always occurs during the first half of the gestation period, sometimes before the end of the second month, the hemorrhage is very profuse and requires rapid intervention. The diagnosis is based upon the determination of pregnancy with the appreciation of the local findings.

Pregnancy in the horn of a bicornuate uterus should not cause difficulty in diagnosis, if the pregnancy has gone to the fifth month or more and the fetus is still living. During the first half of gestation, in addition to the subjective symptoms of pregnancy, one should ascertain the presence, alongside the non-impregnated cornu, of the impregnated cornu, which is of a doughy consistency, unless the fetus is dead. In such event the impregnated uterine horn becomes harder and more globular, so that it may be mistaken for a pedunculated myoma, or perhaps an ovarian cyst. But if one takes all factors into consideration, the history and the objective symptoms to be found on bimanual examination, the diagnosis should not be difficult under ordinary circumstances. It may, however, be quite difficult if the patient is corpulent and has rigid abdominal walls.

Judging from my own experience the greatest difficulty in making a correct diagnosis is in differentiating an ectopic gestation in its early stages from purulent inflammatory

conditions of the adnexa, because, with the latter, patients sometimes give a history identical with that of ectopic gestation, and objectively the tube is distended and firm in consistency. Also, the change in the uterus and in the vaginal mucous membrane may be similar. We may have the delayed or omitted menstruation, or atypical bleeding, and I have seen cases where the blood was similar to that described above as typical for the bleeding of interrupted extra-uterine pregnancy. Furthermore, the character of the pain is sometimes identical, except that collapse never follows, as is usually the case in profuse hemorrhage. I frankly confess that occasionally, in such cases, I am unable to make the differential diagnosis without a surgical intervention.

Such occasional resemblance is, however, comparatively seldom met with. The instances that I have seen were invariably cases of acute pyosalpinx, or chronic cases with an acute exacerbation. Furthermore, two symptoms to which I have learned to attach importance were also absent, namely, *pain in the lower part of the rectum, and pain on moving the vaginal portion of the cervix forward with the examining finger.* It is difficult to explain why these symptoms should be absent, because there is present a perimetritic inflammation in that locality.

In most cases of tubal suppuration there is no softening in the consistency of the uterus, especially of the portio vaginalis; in fact this is usually quite firm. Furthermore, colostrum is but seldom found in the breasts of such patients, because either they never have been pregnant, or they have been sterile for a number of years. It is well, therefore, to bear in mind the possibility of error, especially in this class of cases, and particularly if one or more symptoms of a typical history, or one or more of the objective symptoms of ectopic gestation, are wanting.

The error most frequently made by physicians is that of mistaking ectopic gestation for early abortion. I have cared for more women with extra-uterine pregnancy who had been

curetted by their attendant under the impression that they had had an incomplete abortion than for any other erroneous diagnosis. In taking the history it will be found that with abortion cases the pains usually begin with a moderate aching or drawing pain in the lumbar region, radiating toward the hypogastrium. In tubal pregnancy the pains are much more intense and are unilateral in the beginning, and the periods of intermission are generally farther apart.

In abortion the blood is usually or frequently passed in clots; in the bleeding from ectopic gestation it is smeary, quite dark, and of tarry consistence, and large clots are rarely passed. Furthermore, the quantity of blood lost in abortion is much larger than is the case either in tubal rupture of the partial variety or in tubal abortion. (Extensive tubal rupture does not come into consideration here for differential diagnosis.) Occasionally, however, the blood in ectopic gestation is very light in color; but then the color is so much lighter (a pale pink, in fact) that one should not mistake it for the bleeding of early abortion.

On bimanual examination the changes to be felt in the uterus are usually more marked in abortion of an intra-uterine pregnancy than is the case in extra-uterine pregnancy. In the greater number of patients with extra-uterine pregnancy the ovum with its sac may be felt, which is not the case with early abortion. There is, however, a risk of mistaking between an early intra-uterine pregnancy and a co-existing hydrosalpinx, pyosalpinx, or small ovarian cyst. In such conditions, indeed, it may happen to the most experienced diagnostician to err, although, so far, fortunately, it has not happened to me.

I have always relied upon the more pronounced changes that take place in intra-uterine pregnancy, so far as the uterus and the vaginal mucous membrane were concerned. In some instances it is undoubtedly good practice to wait and keep the patient under careful observation. If such patient comes under observation without the subjective

symptoms of an interruption of ectopic pregnancy, and one perhaps suspects this abnormal condition, then the history aids very much in helping to decide the true status; because in ectopic gestation patients seldom go longer than six weeks, or at the utmost two months, without showing symptoms pointing to the condition we are now considering. Furthermore, an intra-uterine pregnancy of two months' duration can in most instances be diagnosticated by an expert; exceptions may occur, however.

It has happened recently, and during a comparatively short period, that I have been called to see three different patients with a view to operating upon them for extra-uterine pregnancy, when in reality they had a retroflexion of the gravid uterus in the second or third month of gestation. The pregnant uterus, lying in the cul-de-sac of Douglas, was mistaken for an hematocele, the elongated cervix being mistaken for the whole uterus. This may lead to an error, especially when the abdominal parieties are thick, so that palpation becomes difficult. If one is careful such an error need not occur, because in retroflexion the cervix usually has a direction upward and backward, a combination of flexion with version, and the upper part of the uterine neck does not broaden out as the corpus of the uterus broadens above the neck. Furthermore, if one reaches high up, the acute flexion angle can be felt, and the body of the pregnant uterus can be traced in connection with it. Of most importance is the fact that the body of the uterus is absent anteriorly. In addition, bladder symptoms in retroflexion are usually more pronounced than they are likely to be in instances of hematocele. Pelvic pain is also likely to be a more marked symptom of hematocele than in retroflexion of the gravid uterus. While atypical bleeding is present almost invariably in hematocele, it is seldom that a patient with retroflexion of the uterus loses blood unless abortion is imminent, and then the character of the blood is different in the two conditions. In retroflexion the pregnant uterus has an even, round contour,

whereas in hematocele the contour is more or less irregular. In hematocele the consistency of the retro-uterine tumor changes very soon, whereas in retroflexion the consistency of the posterior tumor does not change, unless uterine contractions occur at the time when the examination is made; but such change in consistency should be readily appreciated by anyone with experience.

I remember two cases in which the lateral version of the normal pregnant uterus gave rise to an error in diagnosis by the attending physicians; the lower segment of the uterus remained anterior and was firm in consistency, whereas the large lateroverted segment was relaxed, and, being to one side of the median line, gave the gentlemen the impression that they had an extra-uterine pregnancy to deal with. The history and the direct connection with the lateral displacement, with subsequent correction of the displacement, readily cleared up the cases.

A large hematocele, in which the inflammatory reaction has passed off, and the upper contour of the hematocele in consequence has become more sharply defined, may give rise to the erroneous diagnosis of an ovarian tumor, because the upper boundaries of such hematocele are smooth and rounded off, and in connection with the uterus, have a moderate degree of mobility. But one accustomed to examining many gynecological patients can readily discern the difference between a large hematocele and an ovarian tumor, even if the latter is diffusely adherent. An ovarian tumor is always of a more globular, a more symmetrical contour. The uterus is rarely so much displaced upward and forward in an ovarian tumor as in the case of a large hematocele.

Appendicitis may sometimes be mistaken for extra-uterine pregnancy, or the opposite error may occur. In an inflammation about the appendix, however, the exudate, if there is one, will be higher up in the pelvis, more toward the iliac fossa. Furthermore, there is always a febrile condition in appendicitis, and none of the symptoms of pregnancy are

found unless pregnancy and appendicitis are co-existent. Besides, if one is careful in eliciting a patient's history, there will always be found a difference.

A perforative peritonitis may resemble a ruptured tubal gestation with profuse internal hemorrhage, both conditions being associated with an attack of intense abdominal pain followed by collapse. In appendicitis with perforation there is absence of the symptoms of profuse internal hemorrhage; instead of the anemia which exists in extensive rupture of tubal gestation, the peculiar facial expression of peritonitis is seen, and continuous pain is a more prominent symptom.

The history is likely to aid us very much. With perforative peritonitis we are not apt to get a history pointing to pregnancy; on the contrary we are often able to elicit facts pointing to a previously existing lesion of another organ in the abdominal cavity. An additional aid may be found in the use of an aspirator syringe with an exploratory needle of fairly coarse caliber, with which the cul-de-sac of Douglas can be punctured through the vagina without the use of an anesthetic. If on aspiration the syringe barrel is filled with blood, and other evidence corroborative of ectopic gestation is present, we may be quite certain that it is not a perforative peritonitis that caused the severe illness.

While I have endeavored to outline briefly the conditions which are likely to help in establishing the diagnosis of ectopic pregnancy, as a result of my own experience, I freely admit that even the most expert diagnostician cannot be infallible.

DISCUSSION.

Dr. Edward H. Ochsner, of Chicago.—While the diagnosis of extra-uterine pregnancy in the uncomplicated cases is usually very easy, the complicated cases are often very difficult.

About a year ago I had a case which was a complete surprise. A woman, aged thirty-five years, married ten years, giving a history of having previously had six miscarriages. She was admitted to the hospital in labor pains, and in the course of three hours expelled a two months' fetus. She progressed nicely, but continued to have a little fever. I felt then that there could not be anything left in the uterus, as the ovum had been expelled intact. At the end of a week I made a vaginal examination and found a considerable mass to the right of the uterus. I naturally came to the conclusion that she had an old inflammatory process in the right adnexa which had been the cause of her repeated miscarriages. I consequently made a laparotomy, and to my great surprise found a right extra-uterine pregnancy of exactly the same degree of development as the intra-uterine pregnancy which she had expelled a week previously.

Such complications as the above, and others which might be mentioned, are the things that make the diagnosis of extra-uterine pregnancy often difficult and sometimes impossible.

Dr. Henry D. Fry, of Washington, D. C.—I only want to speak of one feature in connection with the diagnosis of ectopic pregnancy, and that is in the early stage the diagnosis is cleared up if we get a pretty large Fallopian tube. I am speaking now of the diagnosis in the fifth week and the first half of the sixth week. I have had occasion, half a dozen times, to make a diagnosis of ectopic pregnancy simply from the subjective symptoms, and I have had occasion to examine these women under an anesthetic, feeling it was important, and have been unable to find any pathological changes in the Fallopian tube, and the absence of any mass or tumor in the tube would not exclude a diagnosis of ectopic pregnancy. I have examined these cases very carefully in the early stages, and have lost the opportunity of operating before rupture of the sac because I could not make out any condition which would justify operation. The diagnosis of ectopic pregnancy was merely based on the subjective symptoms. I have examined these cases again in a week or so, and then found a mass. But in all these cases I have operated on there has been a partial rupture of the sac, so that I have lost the opportunity half a dozen times of operating before rupture, and I think in the fifth and first half of the sixth week we cannot expect to find any enlargement of the tube. We must wait until

the second half of the sixth week before we can recognize any enlargement of the tube.

Dr. F. D. Smythe, Memphis, Tenn.—I am sorry that I failed to hear Dr. Boldt's paper. However, I will report a recent experience in operating upon a case for acute appendicitis. During the preparation of the patient for operation for appendicitis there developed a rapid increase in the pulse rate associated with evidence of profound shock. The abdomen was hurriedly opened and there gushed out an enormous quantity of blood, and I felt that I was dealing with a hemorrhage from a ruptured extra-uterine pregnancy.

The vessels were clamped on both sides as rapidly as possible, my assistants at the same time performing intravenous transfusion, the patient apparently practically dead.

I removed a fetus of about four months, which was free in the peritoneal cavity, and bailed out the blood and cleaned up somewhat. The appendix was then examined and found highly inflamed, bordering on gangrene. The uterus was about the size of a four months' pregnancy. It was not, however, examined closely, for the reason that I was anxious to get out. The night following the operation the patient had a miscarriage, expelling a fetus of about four months.

These fetuses were turned over to the Professor of Obstetrics at the college with which I am connected.

I report this case for the reason that it was unique in my experience. The uterine gestation and the extra-uterine pregnancy were very much like those in the case reported by Dr. Ochsner.

I have rarely seen a case of extra-uterine pregnancy advance so far as this, although they sometimes go on to full term.

Dr. I. S. Stone, of Washington, D. C.—Dr. Boldt's paper has almost entirely covered the ground of diagnosis and pathology of extra-uterine pregnancy. If we had the privilege of discussing this subject in its various phases, it would take an hour or more, and yet we are supposed to come here with our knowledge at our fingers' ends, hear a paper that is read very rapidly, and are expected to discuss it in five minutes. We cannot do so; we should at least have abstracts. Dr. Boldt read his paper so rapidly that it was impossible to comprehend all of his valuable suggestions. It required the closest attention to follow him, and it was almost impossible to follow him as he read it and understand it. Why? Simply

because he felt that he did not have time to read it, nor we the time to hear him. But if we had known something about it in advance, we might discuss it more intelligently. But we cannot do so in five minutes. What is the consequence? There is not one of us who can or will discuss the paper on its merits. We can only discuss this or that particular feature of the paper. I say that in all kindness and frankness.

I want it distinctly understood that I am going to sacrifice the pleasure I would have in discussing the pathological features of the subject. I would like to say that in nearly every respect I agree with him. If I understood him rightly, there are certain hemorrhages in extra-uterine pregnancy which ought to claim our attention in diagnosis. I have oftentimes watched for indications of extra-uterine fetation, as outlined in the history of cases, and yet microscopic examination has failed to show any chorionic villi. (The chair announced the expiration of the five minutes allowed for discussion.)

Dr. James A. Goggans, of Alexander City, Ala.—I want to commend the paper because I think it is a valuable one. There is one point I wish to emphasize in connection with it, and that is the importance of diagnosis when we finally come to the manner in which we operate. There are some cases of tubal abortion, where the blood is extravasated into the pelvic cavity, through the fimbriated extremity of the tube, requiring a laparotomy to evacuate it and to finish the operation; again in ruptured tubal pregnancy it is necessary to be able to make a diagnosis as to the direction of the rupture, and where the rupture takes place downward and into the folds of the broad ligament we can make a vaginal section and cure the case without laparotomy. In case the rupture is on the upper surface of the tube the blood is extravasated in the abdominal cavity, and the best method of operation would be by laparotomy.

SUBTEMPORAL DECOMPRESSIVE OPERATIONS FOR THE INTRACRANIAL COMPLICATIONS ASSOCIATED WITH BURSTING FRACTURES OF THE SKULL.

By Harvey Cushing, M.D.,
Baltimore.

Definite rules of procedure in the treatment of fractures which involve the cranial vault are to be found in the earliest medical writings, and with but little modification have been accepted as a part of our modern practice. These precepts are chiefly concerned with the reduction of deformations of the skull, which have resulted from fragmentation of one sort or another at the pole of impact.

It is otherwise with fractures involving the cranial base; for beyond an ice cap, recumbency, and free evacuation of the bowels, the surgeon's attitude toward these patients, if he is interested at all, lies in the making of a diagnosis to determine, if possible, into which fossa the lines of fracture have run, in the observing of symptoms to see if, by chance, there is a "free interval" interpreted as an indication of meningeal hemorrhage, and in the giving of a prognosis which, according to Bergmann's dictum, is good (for life though not necessarily for subsequent health) if the patient survives the first two days following the injury.

As a matter of fact, though we speak of a well-recognized class of injuries as "Fractures of the Base"—a term which conjures up a definite clinical picture—the fracture itself is practically of no importance whatsoever; there is no dis-

location of fragments owing to the pull of the muscles as elsewhere on the skeleton; the cracks, which, indeed, may often be very difficult to find postmortem, unite promptly if life is spared, and so far as the bony injury is concerned no active measures are needed. Injuries, however, of such a character that they lead to a bursting fracture, with meridional fissures which radiate into the base, almost invariably produce serious symptoms from an accompanying lesion or lesions of the brain.

Is there any more or less routine method of intervention which can promptly be utilized to meet the intracranial symptoms which accompany these basal fractures, in the presence of which surgeons usually adopt a waiting policy?

Without entering into the controversy as to what is concussion and how its manifestations and anatomical lesions differ from those of contusion, it may be said that the symptoms of most of these cases are brought about by an increase of intracranial pressure, whether *immediate,* from free extravasation due to the laceration of cortical vessels, *intermediate,* often with a "free interval" of consciousness, when an extravasation outside of the dura slowly augments in size, or *late,* often a matter of a few days, when cerebral edema occurs. In many cases, indeed, the symptoms of these various conditions shade imperceptibly into one another.

The phenomena of compression are so well understood that they need not be detailed; the slow pulse, the rise in blood-pressure, the headache, vomiting, and choked disk are seen in their most typical guise in these cases. Particularly have we found that the condition of the eye-grounds is most helpful in recognizing an advancing process, and the presence of free extravasation in the subdural spaces, as is well known, can easily be determined by a lumbar puncture.

During the past three years, in a fairly large series of cases, we have followed the routine of making a subtemporal exploration through a split-muscle incision combined with a subtemporal decompression, namely, the removal of a circle of

the thin bone, about 4.5 cm. in diameter, from under the muscle, together with a dural opening. Contrary to our former high mortality in cases of basal fracture, about 50 per cent., we have only lost two of our last fifteen cases, both of these due to the fact that a unilateral exploration alone was performed, and an extensive extravasation—extradural in one case and subdural in the other—on the opposite side of the head was overlooked.

The advantages of the procedure, in addition to its simplicity, may be summarized as follows: (1) The approach is made through the thinnest available part of the skull. (2) The opening is made under the temporal muscle, the fibers of which are split and not divided, so that, when closed, they serve to prevent too great bulging if the tension tends to make the brain herniate, and serve also to prevent a subsequent obtrusive depression when the normal conditions have been restored. A subsequent defect in this situation is absolutely harmless. (3) In case there has been a rupture of the meningeal or of one of its branches the extradural clot is certainly brought into view by this opening, and as the meningeal trunk is exposed the vessel can be easily ligated. (4) In all bursting fractures, accompanied by laceration of the brain, it is the tips of the temporal and base of the frontal lobes which most frequently suffer, and a subdural extravasation from this source can most readily be dealt with through an opening in this situation. (5) In a large proportion of bursting fractures the lines of fracture seek out the midcranial fossa, and hence free bleeding from the base can be most easily drained through the temporal fossa by protective drains placed under the temporal lobes. (6) The subsequent edema and swelling of the brain, which is an almost invariable sequel of any serious cerebral contusion and which is responsible in many cases for the pressure symptoms during the first two weeks, can be best combated in this situation under the muscle. (7) Aside from the prompt subsidence of the acute symptoms, which are often seen after these operations, they

appear to lessen many of the unpleasant late sequels—traumatic neuroses—which are so often a feature of the cases which have recovered without operation.

I believe, in view of our experience with this simple operation, which, in so far as the approach to the cranial chamber is concerned, differs from the subtemporal decompression operation for tumors only in the obliquely vertical instead of curvilinear direction of the scalp incision, that less risk is run even in the milder or borderline cases by a prompt exploration and decompression than in waiting for Nature to take her own course in absorbing extravasations and edema in an unopened skull.

DISCUSSION.

Dr. J. Shelton Horsley, of Richmond.—Dr. Cushing has done such excellent work in brain surgery that any statement he may make should receive our careful consideration. I have no doubt that in bad cases of cranial fracture at the base this procedure would be life saving. It seems to me, however, dangerous to recommend it as a routine procedure for every case of fracture of the base of the skull. There is one feature we must remember, and that is even when the operation is done, as Dr. Cushing has indicated, it produces some slight shock to the patient. In addition to that it is bound to injure the brain substance to some extent. Phelps, of New York, who has had an extensive experience in traumatic brain surgery, called attention to the fact that a good many of these cases terminated fatally, not from direct pressure of the clot, nor from contusion of the brain, but from the edema in the brain substance that supervenes after the original injury. In borderline cases this edema may be slight. Craniectomy, while it would produce no harm under ordinary conditions, adds to the already existing hyperemia in a case that has suffered a fracture at the base to such an extent that edema may promptly kill the patient.

In cases of cranial fracture, which are of considerable severity on account of the accompanying injury to the brain, if there are indications of extensive cerebral injury, together with a

high temperature without infection, it seems almost hopeless to operate. The statement has been made—and it has not been successfully controverted—that if in a cranial injury without infection the temperature of the patient reaches 105°, recovery is impossible under any circumstances or conditions, because this indicates a degeneration of the cerebral cells too extensive for recovery. If there are symptoms of hemorrhage or of focal lesions, which can be reached, then I think Dr. Cushing's procedure will be valuable. But it seems to me it would be inadvisable to operate on patients who are practically moribund, on the one hand, or upon those whose recovery seems most probable without operation, on the other. There is a middle class of cases between these extremes who would undoubtedly be benefited by operation.

Dr. Robert T. Morris, of New York City.—I rise to speak of one point in connection with this paper. I understood the essayist to say that if there is bleeding from the ears he would drain on both sides. I would like to ask him if he would drain on both sides in case there was bleeding from one ear, as he seems to make the point of bleeding from the ear a critical point for operation?

Dr. F. W. Parham, of New Orleans.—I have been much interested in Dr. Cushing's paper. We encounter a number of these cases in our Charity Hospital, and I have often been at a loss to know how to handle them. I have generally let them alone and watched them, but in many of these cases I am satisfied that the procedure Dr. Cushing has suggested ought to be carried out. I would like to ask him if he has tried, as a temporary means, to tide over these patients through the dangerous period of shock, the suggestion of Ballance of reducing temporarily the pressure by spinal puncture?

Dr. R. M. Cunningham, of Ensley, Ala.—During the last six years, speaking roughly, we have had between 50 and 60 cases of fracture of the cranium. Of this number 12 have died, all with fracture of the base, with one exception, which was an extensive fracture of the vault. I cannot tell yet why he died.

Dr. Cushing, in my judgment, has submitted to this Association a very valuable paper. Our policy has been a waiting one in fracture at the base. We have endeavored to disinfect the adjacent cavity, and in my judgment this can only be done in the ear. Our experience has been that where there has

been considerable hemorrhage from the ear, by douching the ear with a weak bichloride solution—never using peroxide of hydrogen under any circumstances in that locality—and by the application of moist gauze over the ear, the whole side of the head being rendered aseptic, our results have been better. The blood mechanically cleanses, and, at the same time, disinfects. The cause of death in these cases has been infection and meningitis. In one instance the pneumococcus was demonstrated in the brain fluid. I agree with the essayist that the fracture itself is of very little importance, but that hemorrhage in a basal fracture gives us a bad prognosis. Infection, in my judgment, is the real danger, and it occurs to me that this operation that Dr. Cushing suggests will, in a measure, be a preventive of infection. It is a rational procedure, and I think I shall try it when opportunity presents itself.

Dr. J. M. Mason, of Birmingham, Ala.—Dr. Cunningham mentioned the cases of fracture of the skull that had come under his observation, and presses the opinion that his fatal cases died from infection. I have had a series of 23 cases of fracture of the skull. Of this number there were 9 cases of fracture of the vault. None of them died from infection, but a few cases of fracture of the base died either from progressive hemorrhage, edema, or from multiplicity of the intracranial lesions. A fracture of one side of the head frequently produces traumatism on the other side. I have tried to get autopsies on all the fatal cases, and death is usually due to the causes that have been pointed out by Dr. Cushing. Disinfection of the adjacent cavity is important to prevent infection.

Speaking of the points brought out by Dr. Horsley, particularly high temperature, I believe it is quite unusual to have high temperature come on early in these cases. The high temperature usually appears after other symptoms have developed. Where the pressure is increased and there is compression, the operation suggested by Dr. Cushing ought to be made use of before the case has progressed far enough to bring about serious symptoms of intracranial compression.

Dr. Cushing (closing).—I think the remarks made by Dr. Mason answer the question raised by Dr. Horsley. In advocating this measure for cases in which subdural hemorrhage or deep extravasation from laceration of the temporal lobes is present—cases in which there is free bleeding in the middle

cerebral fossa—the decompression is made, with removal of bone and opening of the dura, for the purpose not only of immediate drainage, but also for the purpose of combating the pressure symptoms from subsequent edema.

High temperature does lessen a favorable outlook; the prognosis in these cases is less good. Still I think one should not hesitate to operate in the presence of a disturbing complication of this sort any more than he should hesitate to operate, for instance, for appendicitis in the presence of general peritoneal involvement.

In reply to Dr. Morris' question in regard to bleeding from both ears, the symptom is helpful in telling us that meridional fissures have radiated into the petrous portions of both temporal bones, and that each drum has been ruptured; but aside from that I cannot see that bleeding from the ears affects the progress or treatment of the case, except, perhaps, to favor a bilateral exploration. Bleeding from the ear does not necessarily mean that the dura has been injured or the brain in that region. The condition inside the dura is what really concerns us. A decompressive operation is a comparatively simple procedure, and if one does not find on one side sufficient evidence of trouble to account for the symptoms, it is a simple matter to open up the other side to determine whether or not there is extensive extradural or a subdural lesion in that situation.

With reference to Dr. Cunningham's remarks, I hardly believe that the greater number of cases of basal fracture die from infection. My impression, from the few cases I have seen, is that the infection rarely comes through the middle ear, but rather through the nose, secondary to fracture of the ethmoidal plate. This leads usually to a pneumococcal type of infection. I do not myself pay much attention to the ear, aside from simply cleansing it, and irrigation of any kind should be avoided. Mr. Crow's observations on the elimination of urotropin should make the administration of this drug desirable in every case in which meningeal infection is likely to occur.

FURTHER NOTES ON HARMFUL INVOLUTION OF THE APPENDIX.

By Robert T. Morris, M.D.,
New York City.

It was my intention not to present a formal paper, but to make running comments upon a series of specimens, but I was called to a distance just before coming to the meeting, and did not have time to get to New York to get the specimens.

The appendix vermiformis, undergoing involution changes, produces disturbances of such insidious character that a comprehension and study of the symptoms leads one to believe that a greater amount of trouble, on the whole, is caused by such appendices than by appendices which are the seat of infective processes. Perhaps the larger number of patients who walk to the doctor's office today, asking to have their appendices looked after, never have had and never will have "appendicitis" as the term is commonly understood. I make the distinction between patients who walk to the doctor's office and those who call the doctor to the house. Degenerative changes in the appendix are commonly found in early life, but the symptoms dependent upon such changes do not often attract the attention of the patient until he is past twenty years of age. There is fibroid replacement of the lymphoid, mucous, submucous, and muscular coats, and sometimes even the peritoneal coat is replaced by connective tissue. Curiously enough, nerve filaments remain in these degenerating appendices long after the large bloodvessels have been pinched out by the contracting hyperplastic con-

nective tissue, and they remain among the last of the normal structures. The irritation caused by the engagement of these nerve filaments, in contracting connective tissue, leads to two distinct sets of symptoms—sensory and reflex. The sensory symptoms attract the attention of the patient on account of the discomfort in the appendix region. There is sometimes real pain, but, as a rule, we have only a little burning sensation which leads the patient to press upon the appendix region occasionally with his hand, or to lean against a chair or table. The movement with the hand is so characteristic that I have many a time made a diagnosis of this type of appendix the moment that the patient came into the office and began to talk about his case. The reflex symptoms are probably due to irritation of the intimate ganglia of the bowel wall (Auerbach's plexus and Meissner's plexus) secondary to pinching of entrapped nerve filaments in the contracting appendix tissues. These patients suffer from intractable intestinal dyspepsia, and sometimes from gastric dyspepsia as well. So far as my observation goes, this fibroid degeneration of the appendix is the most common single cause for so-called intestinal dyspepsia. The cause has been regularly overlooked until very lately, but at present a number of physicians are making the diagnosis. There is one diagnostic point of determining value in these cases. Press with the tips of the fingers at a point about an inch and one-half to the right of the navel, and carry the fingers down to the site of the right lumbar ganglia. If the ganglia are hyperesthetic make a note of the fact, and then press at the corresponding point for the left lumbar ganglia. If these are not hyperesthetic, we may be pretty certain that the appendix is the malefactor in the case. If both right and left groups of lumbar ganglia are hyperesthetic, we must look to the pelvis for the source of the symptoms. If neither right nor left lumbar ganglia are hypersensitive, we will have to look elsewhere than to the appendix, or to the pelvis, for the cause of the bowel or stomach disturbance.

Although these cases of fibroid degeneration of the appendix seem to cause the largest number of "appendix patients," it is probable that the condition is actually protective against true infective appendicitis, for the reason that the structures attacked by bacteria in infective appendicitis are removed by the degenerative process. Fibroid replacement of appendix structures is found in patients who have had one or more attacks of infective appendicitis, but these cases are quite different in character, because nerve filaments are destroyed along with other structures at times of acute infective invasion, and we do not have the nagging discomfort and the peculiar persistent intestinal dyspepsia that belongs to appendices undergoing fibroid degeneration. Because some of my assistants began to call the latter type of appendix by my name, the nomenclature was taken up and it promptly went wrong, and is at the present time indiscriminately applied to perfectly normal appendices and to scarred appendices resulting from acute infection, as well as to the degenerating appendices that had engaged my attention.

DISCUSSION.

Dr. Stuart McGuire, of Richmond.—I have heard Dr. Morris speak on the normal involution of the appendix before, and what he has said has been of practical service to me, and I wish to go on record as saying that the Morris point on the abdomen is as important as McBurney's point. Dr. Morris said he has been misunderstood and misinterpreted, and this, in my opinion, is largely because of his bad nomenclature. Involution is a normal process; therefore, it is tautological to say normal involution. Disease of the appendix is a pathological process, therefore it is wrong to speak of it as a physiological process. The condition, I believe, indicated by the title of Dr. Morris' paper is analogous to cirrhosis of the liver—the substitution of connective tissue for normal tissue. No one would speak of cirrhosis of the

liver as an involution of the liver. In this condition of the appendix, which gives definite symptoms and destroys the health of the individual, it seems to me the term metaplasia of the appendix should be employed and thereby save embarrassment and uncertainty as to what is meant.

Dr. Edward A. Balloch, of Washington, D. C.—I have the pleasure of enjoying much the same reputation in Washington as Dr. Morris does in New York. I have heard many of these chronic appendicitis cases called by my name; yet, at the same time, I want to endorse every word Dr. Morris has said. If these patients have dyspeptic symptoms and we test their stomachs and gall-bladders and cannot find the trouble, and we get down to the point described, begin to make pressure there and they complain of pain, and we take out their appendices and see them get well and the digestive troubles disappear, then we feel a certain sense of satisfaction in doing good work in that respect. While I sympathize with the position taken by Dr. Morris, yet I do not believe we ought to feel badly about it, as we may hope that we are doing pioneer work.

Dr. Herman J. Boldt, of New York City.—I was very much interested in Dr. Morris' paper, and desire to say that I have taken out a number of such appendices as he has referred to during the course of other intra-abdominal operations. I have had them examined by a competent pathologist, and invariably, in connection with the involution of the appendix, there has been an inflammatory process demonstrated. These appendices gave distinct local and reflex symptoms, which have disappeared subsequent to their removal. While such appendices may not be harmful, so far as endangering life is concerned, yet, it seems to me, they are undoubtedly harmful so far as the well-being of the patient is concerned, and in view of the fact that the removal of these appendices can be done with practically no mortality, and in view of the further fact that they do give rise to reflex symptoms, I see no reason why we should take the position to let them alone, provided the patients are willing to save themselves three or four years of illness, or chronic invalidism, by a simple operation like an appendectomy, under such circumstances, would be. Therefore, I would, in view of the pathological condition, and of the symptoms sometimes caused by it, recommend the patient to have an operation done.

Dr. Morris (closing).—I am very glad to have Dr. McGuire suggest a change in the nomenclature in order to clear up the point, and particularly if we could have a definition of metaplasia. If we had a good definition of that, we would have the field covered.

In regard to the point made by Dr. Boldt that these appendices show an inflammatory process regularly, I will say that there is a grouping of new cells around the nerve filaments which persist and get up a high degree of irritation, and that was a point I brought out in connection with my photomicrographs, which I presented on a previous occasion. I showed that this inflammatory process is present in a high degree; but it is an irritative process and not an infective one. Most patients who come to doctors' offices come in with appendices in the form of a question-mark, and the matter of infection present or absent is one that is most frequently discussed. In every town and city in the United States that question is discussed among patients (infection), and the question as to whether it is simply a matter of irritation or not is not often discussed. That is the point we want to talk about and bring before the profession. In the cases that come to doctors' offices we more often find no infection—irritation instead.

Dr. Boldt says that this is a harmful process. It is, but it does not always demand operation. I say to a patient, who is a little below par in health, that he is likely to be subjected to a great many different kinds of diagnoses. He is likely, for instance, to go to a gastro-enterologist, who will put him on square pieces of food for breakfast, round ones for noon, and cross ones at night, until he gets tired of it. He is likely to be cross to his wife, and his wife does not care whether he comes home or not at night. In fact he is likely to find fault with the present political situation, and is very apt to be an undesirable citizen on account of this irritation. Such a state as that is going on all the time. Such a man does not actually need to have his appendix taken out, but I tell him that he can do just as he pleases about it. It will never kill him, and yet the condition of the appendix may keep him in rather poor health. Such patients go away and are not likely to submit to an operation at that time, but later they come back and submit to operations. They are anxious for you to remove their appendices and put them in

bottles. That is the way the question works out eventually. On the other hand, when a patient has an infected appendix, I say, speaking from the standpoint of a surgeon, Two o'clock this afternoon we will operate. Another doctor will say, Let us try sweet oil. Another one says, Let us try ice and opium, and if the patient is not better by tomorrow morning, we will operate. Later, the friends of the patient are apt to intervene and say that they would rather wait until tomorrow morning before operation is undertaken, as the patient has not had time to get them in his will; or some member of the family says, I know several patients who have been operated on for appendicitis and have died, while other patients who have been treated medically have recovered. I say to such a person, Two o'clock this afternoon we will operate, and when I say that I mean it, and it is done. That is an entirely different attitude from the one we take with regard to metaplasia of the appendix. The patient takes time and decides in his own way.

CASES ILLUSTRATING THE VALUE OF INTESTINAL EXCLUSION AS A SURGICAL PROCEDURE.

By John Young Brown, M.D.,
St. Louis, Mo.

In three comparatively recent cases the writer has performed bilateral intestinal exclusion for the relief of artificial anus. The ease with which he was able to restore the intestinal continuity by this method, and the satisfactory results obtained, were so far superior to those he has secured from the usual techinque employed in the treatment of this condition, he has been prompted to report the cases in detail.

Case I.—*Strangulated umbilical hernia; the cecum, appendix, ascending and transverse colon found gangrenous in hernial sac; artificial anus, followed later by bilateral intestinal exclusion and restoration of intestinal continuity.* The patient, aged forty-seven years, colored, mother of ten children, was admitted to the hospital suffering from a huge, strangulated, umbilical hernia. Duration of strangulation was eighteen hours. The condition of the patient on admission was bad.

On examination, a large, oval, umbilical hernia the size of an dult head, tightly constricted at the umbilical ring, was found. The skin over the hernia was blistered from hot applications used prior to admission. She was immediately prepared for operation.

Operation. Ether anesthesia. Transverse, elliptical incisions were made, surrounding the umbilical hernia. These were deepened to the base of the hernial protrusion, it being

the intention to do a radical Mayo operation if conditions permitted. The surfaces of the aponeurotic structure were carefully cleared in all directions from the neck of the sac. The skin covering the sac was dissected back, and the sac opened. On opening the sac five or six ounces of offensive, dark, bloody serum gushed out.

The sac was found to contain about two inches of ileum, the appendix, the cecum, the ascending and transverse colon, all of which were found black and gangrenous, the constriction being at the umbilical ring. Without disturbing the adhesions of bowel to the peritoneum at the neck of the sac, the umbilical ring was spit external to the sac. This relieved the constriction. The scissors were next run through the large and small bowel, leaving an artificial anus at the distal end of the ileum through which gas and fecal matter in large quantities began to flow.

A moist dressing was applied, the patient's stomach was again washed, and she was returned to bed in rather bad condition.

Fig. 1 shows the contents of the sac.

Fig. 2 shows the method of relieving the constriction by cutting through the umbilical ring.

The patient slowly reacted. The gangrenous bowel gradually came away, the wound contracted, leaving fixed in the umbilical ring the distal end of the ileum, through which was discharged fecal matter, and the opening which marked the beginning of the descending colon. This is shown in Fig. 3. From this cut it will be seen that the descending colon, sigmoid, and rectum were completely excluded. Through a rectal tube a through-and-through irrigation of rectum, sigmoid, and colon could be made, the irrigating fluid flowing freely from below upward and out through the opening in the colon at the umbilicus.

Second Operation. Ten weeks after the primary operation the intestinal continuity was restored in the following manner:

Owing to the large stump of mesentery and bowel fixed in the

umbilical ring, it was deemed inadvisable to attempt a direct anastomosis by liberating adhesions and resecting at the hernial site. In addition to this it was found that the adhesions about the ring and the contraction of the wound had practically relieved the hernia, there being left only slight mucous protrusions at the two open ends of the bowel. Therefore, after careful cleansing and sealing with gauze and collodion, the two openings of bowel at the umbilical ring, the abdomen was opened below the umbilicus through a median incision.

The ileum was resected close up to its attachment to the ring. The portion of bowel distal to the incision was closed with a purse-string suture, reinforced by a few Lembert stitches. The colon was treated in a similar manner, thus excluding a portion of both ileum and colon. An end-to-end anastomosis was then made between the ileum and sigmoid, the anastomosis being done with a Murphy button. The incision in the abdomen was then closed in layers.

The patient made an easy convalescence after this operation. The descending colon, the sigmoid, and the rectum, which had been out of commission for so long, took up their work in twelve hours. The button was passed on the nineteenth day.

At the completion of the second operation there was left the excluded portion of ileum and colon to be looked after. It was assumed that Nature would evert these pouches, and that they could be removed later. The patient, therefore, was sent home and requested to report at the end of a month.

On her return it was found that the bowel on either side had prolapsed. The bottom of either pouch was seized with a forcep, and the gut was clamped close to the umbilical ring and removed. The clamps were left to come away. The small amount of mucous membrane remaining after the removal of the clamps has since been removed almost entirely with the cautery. There now remains only two slight mucous protrusions, which gives the patient no inconvenience.

Case II.—Patient, a laborer, aged forty-four years, was brought to the hospital suffering from a large, strangulated, inguinal hernia of the right side. Duration of strangulation was thirty-six hours. The condition of the patient was bad. Vomiting was incessant and stercoraceous in character. After thorough stomach lavage the hernial sac was opened under ether anesthesia.

About eighteen inches of gangrenous ileum was found in the sac. After relieving the constriction, which was at the internal ring, the bowel was pulled down until healthy gut was reached. A provisional rubber-guarded clamp was placed on the proximal bowel, and the gut was then cut across. A glass drainage tube, to which was attached a rubber hose, was tied in the lumen of the proximal gut, and both proximal and distal bowel then fixed in the wound. The provisional clamp was next removed, and the gas and fecal matter allowed to escape through the tube.

The patient made a stormy convalescence, the gangrenous bowel gradually came away, and the wound firmly contracted, leaving a "double-barrelled" fistula at the site of the old hernia.

Two months after the first operation the abdomen was opened through the right rectus muscle. Bilateral exclusion was done on the two portions of bowel fixed in the wound, and the continuity of ileum was then restored by an end-to-end anastomosis, the union being made with a Murphy button.

The patient made a perfect recovery. The button passed on the twelfth day. With the cautery the prolapsed mucosa has been almost entirely removed, and two small mucous openings at the site of the old wound give him little annoyance. The scar has contracted firmly and there is no evidence of hernia, save that caused by the two small mucous fistulæ.

Case III.—The third case, while not exactly similar to the cases just reported, presents many points of interest. The patient, a laborer, aged forty-two years, was admitted to the hospital suffering from a huge, ischiorectal abscess with mul-

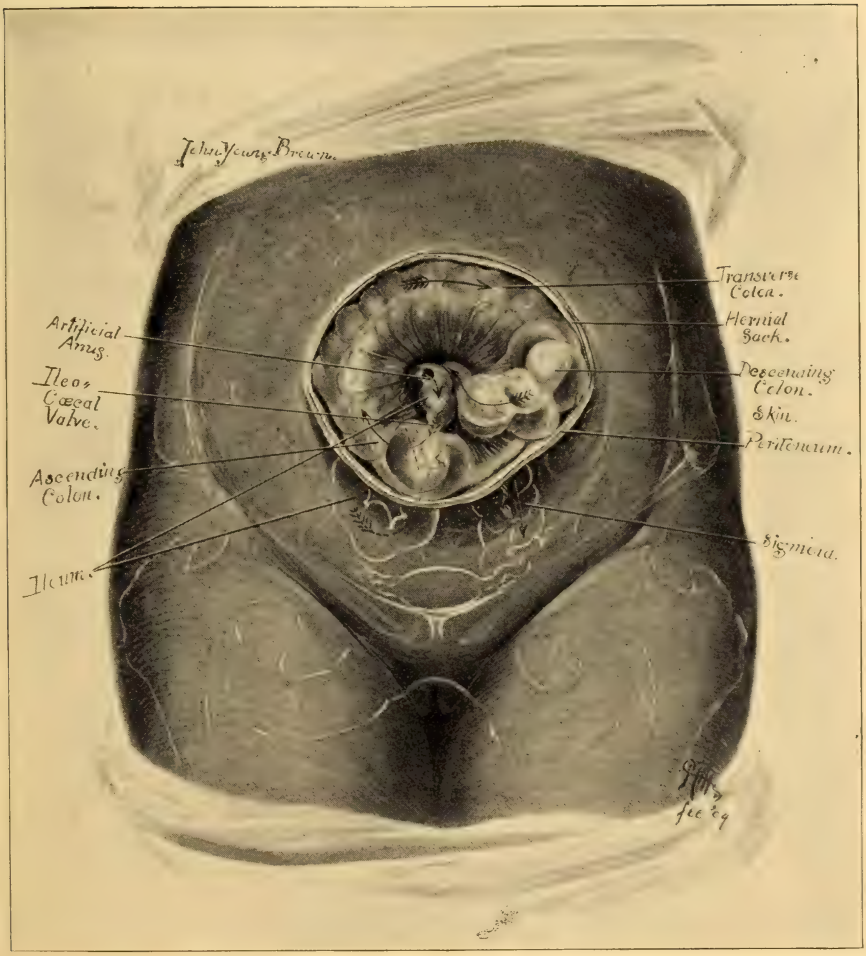

John Young Brown
Artificial Anus.
Ileo Cæcal Valve.
Ascending Colon.
Ileum.
Transverse Colon.
Hernial Sack.
Descending Colon.
Skin.
Peritoneum.
Sigmoid.

FIG. 1

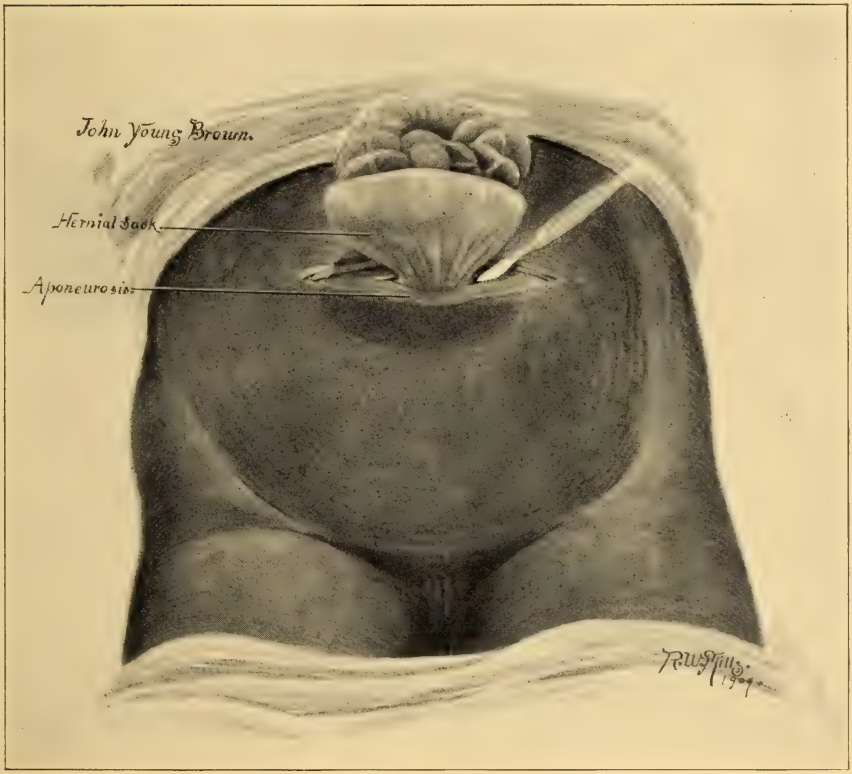


FIG. 2

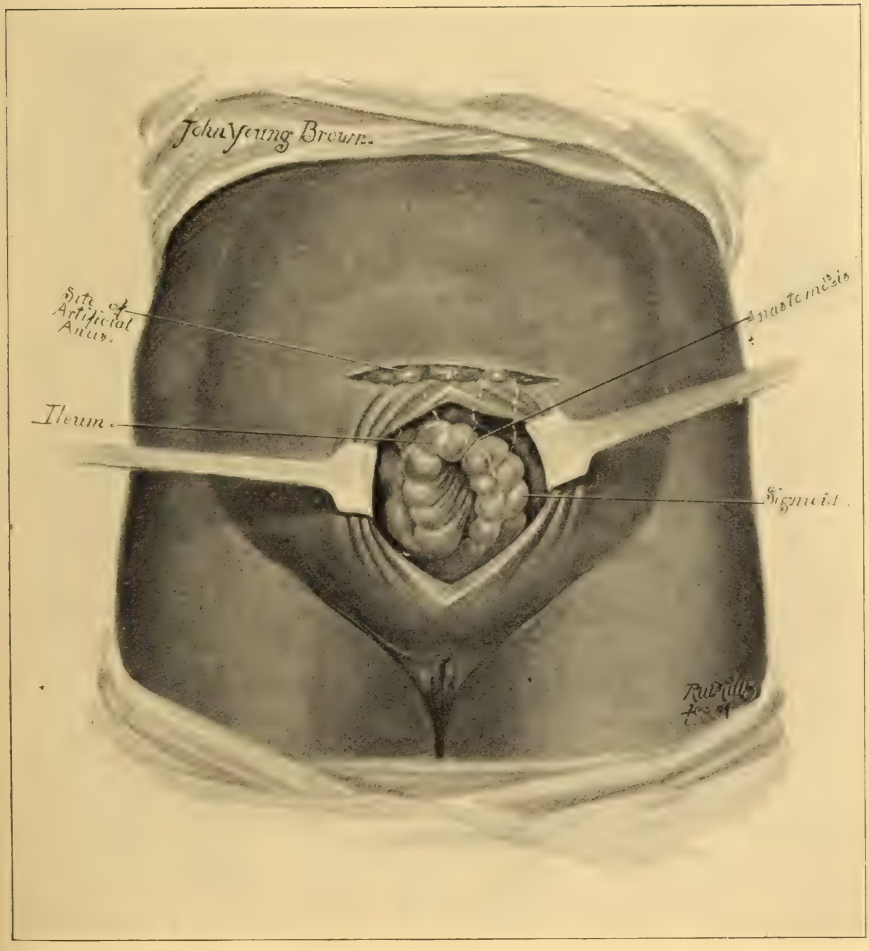

John Young Brown.
Site of Artificial Anus.
Anastomosis
Ileum.
Sigmoid.

FIG. 3

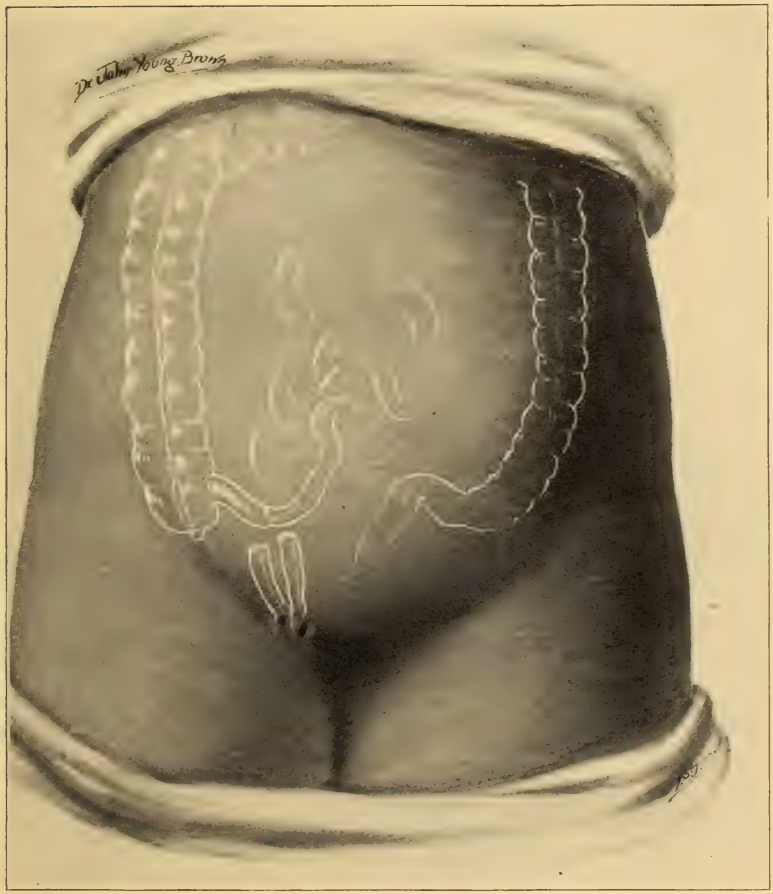


FIG. 4

tiple sinuses in the ischiorectal region, communicating by three distinct openings in the rectum. The coccyx was necrotic.

He was anesthetized, sinuses were laid bare, the sphincter being divided in two places, and the coccyx resected.

Two months of careful treatment failed to heal his sinuses. It was, therefore, determined to exclude the large bowel, thus turning the fecal current in the hope that the wound,

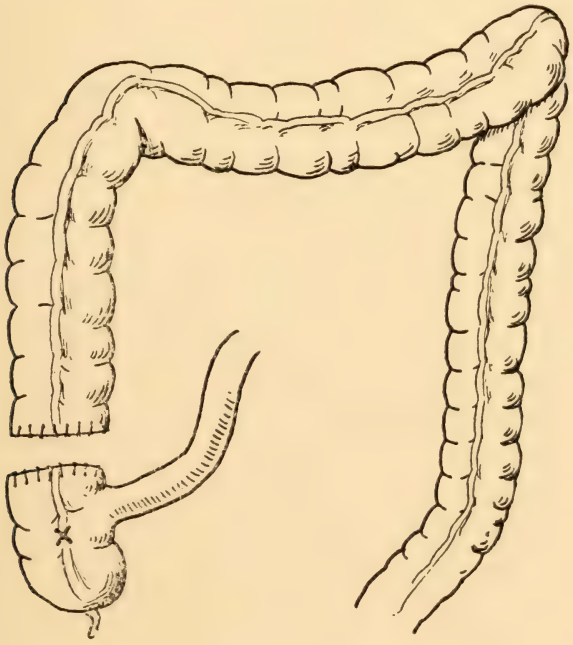


Fig. 5

being relieved of fecal contamination, could be healed. The following operation was done: Through a gridiron incision the cecum was pulled up and cut across. Both distal and proximal ends were closed. The cecum was then fixed in the wound, and an artificial anus made. This procedure is nicely illustrated in Fig. 5.

At the expiration of six months the rectal condition had

entirely healed, and intestinal continuity was restored as follows:

The abdomen was opened through the right rectus. The ilium was clamped close to the cecum and cut across. Both proximal and distal ends of ilium were closed with a purse-string suture. By this procedure the cecum was excluded. This is shown in Fig. 6. A lateral anastomosis was next made between the ileum and ascending colon, anastomosis being

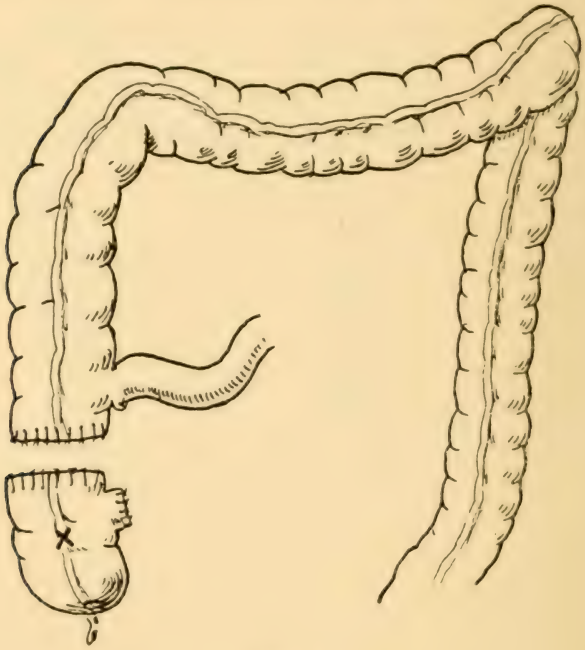


Fig. 6

done with a stitch after the method of Moynihan, thus putting back into commission the large bowel. The abdominal wound was closed in layers.

The patient made a nice recovery following this operation, and his condition today is excellent. The small mucous fistula, marking the opening into the cecum, gives him practically no trouble.

In the opinion of the writer the method above described offers many advantages over those usually employed for the relief of artificial anus. Those advantages may be briefly summarized as follows:

In cases where an artificial anus has been done for the relief of strangulated hernia, and anus made at the hernial site, the irritation resulting from the continuous fecal flow, brings about a contraction at the wound which virtually cures the hernia. Any operation which necessitates a disturbance of this cicatrix by an attempt to restore the intestinal continuity at the hernial site should not be made. The operation of Dupuytren is a blind and unsurgical one, and the process of restoring the intestinal continuity by this method is slow and unsatisfactory. Intestinal exclusion can be accomplished without disturbing the hernial site, and the restoration of the intestinal continuity is accurate and immediate. Contrary to what is generally believed, the operation is not complicated by adhesions. In none of the cases above reported was there any difficulty whatever in carrying out the steps of the operation.

DISCUSSION.

Dr. Charles H. Mayo, of Rochester, Minn.—I regard this as one of the most important papers that has been presented to the Association at this meeting. We know that there are a great many cases of hernia operated on at a late period of their existence when nearly dead from obstruction in which too much is attempted at the primary operation, and this method certainly offers relief to those advanced cases that are unable to withstand the operations that have been done in the past, and if we could relieve the sac of the adhesions which are probably holding the intestine, if we could relieve the obstruction, the patient would go on until such a time when a complete operation could be made with safety.

Only recently I had a case in which two operations had been done previously. The first operation was for the relief of

obstruction, the second for leakage, and in the operation to correct the leakage, trying to work in the wound, an incision had been made almost the length of the abdomen, there being as many as seven intestinal fistulæ in different parts. It was necessary to carry this patient along with rectal enemata to furnish fluid and food, to prevent him from starving. Nine-tenths of the absorption of proteid matter is taken up by the small intestine; nine-tenths of the absorption of the fluids of the body is taken up by the large intestine. When we exclude too much of the large intestine in the removal of the colon, while the patient may absorb a good deal of proteid matter, he fails to get fluids, so that these patients should have, if possible, the upper part of the colon left in exclusion cases. Also, we get dryer fecal matter from the sigmoid side of the ascending colon. Opening the cecum we get fluid feces. If in these cases we do the Mikulicz local method as in removal of cancer of the movable portion of the large bowel, and when the slough is removed, and we have a double-barrel condition left, we can slip a pair of hysterectomy clamps into each barrel, which work their way through by producing pressure necrosis. Where the exclusion of the cecum is done, cutting out too much of the intestine, they cannot absorb fluid or fluids in the small intestine. A very small proportion of the fluids is taken up from that. If that is not true we would have boluses of food in the small intestine which rarely or never occurs.

Dr. Lewis S. McMurtry, of Louisville.—I wish to emphasize a point suggested by the essayist that the operation described is not an ideal surgical procedure, but one to rescue the patient from a condition otherwise hopeless, and permit the application later of a final operation to secure complete restoration of normal conditions. The case reported is an admirable illustration of this conservative method in extreme conditions.

Dr. Edward H. Ochsner, of Chicago.—While I think the essayist is to be congratulated on his excellent contribution, and while I do not wish that anything which I say should be construed as a criticism, there is one thing to be remembered, however, and that is that at the time of the second operation one should, if one possibly can, remove the excluded portion of the bowel. While in the primary operation it is very essential that one should get in and get out as quickly as possible and not do any unnecessary manipulation, by the

time the second operation is undertaken, these patients will have recuperated to such an extent that a more extensive operation can safely be undertaken, and, when possible, it is our duty to remove the excluded portion of the bowel rather than to leave it in. If the excluded portion is not too long one can clamp the mesentery, and tying it off can remove it without jeopardizing the patient's life in any way.

Some years ago, when the originator of the exclusion operation first published his work, he found a great many imitators, especially in Germany. In the succeeding year or two the operation was done many times, but it was soon found that it had quite serious objections. If a foot or two of the bowel is excluded it leaves a disagreeable fistula, which continuously secretes mucus, soils the clothing of the patient, and is a continual nuisance. Therefore, I wish to emphasize again that whenever it is possible to remove the excluded portion of the bowel at the secondary operation it is our duty to do so.

Dr. Alexander Hugh Ferguson, of Chicago.—I am very pleased to have heard the paper of Dr. Brown. It is along the right line, and the results obtained in these cases point out the value of the procedure. I am fully in accord with Dr. Ochsner in believing that sometimes the results are better by removing the gangrenous portion of bowel all at once; the statistics of these operations will support us in that respect. Having lost some patients by removing extensive portions of bowel, I began to go back to the exclusion method, as recommended by Dr. Brown. I have had many cases where I thought it was advisable to extend this exclusion method to chronic cases, as, for instance, in cases of intestinal adhesions due to pyosalpinx or chronic appendicitis, where the bowels were so agglutinated together that if one attempted to liberate them he would have patches of denuded peritoneal tissue, which could not be replaced by flaps from the peritoneum in any way whatever. I have with advantage excluded those portions of bowel. I recall two cases, one of which is in the hospital now, the other having just left, where I adopted the exclusion method. This patient is a young woman, aged twenty-six years, who was operated on in Winnipeg, and had had her appendix removed between the attacks four years ago. Suppuration followed, but whose fault it was I do not know. The fact, however, was that extensive suppuration occurred, which not only glued the intestines together, but the ovaries and tubes. A year ago I removed the two tubes,

one ovary, and the stump of the appendix. At that operation I denuded large portions of bowel and covered some of them over with patches or flaps of peritoneum, as best I could. A month ago she returned with a small right inguinal hernia, and with symptoms of chronic obstruction of the bowel. I took advantage of the hernia to open that region, and found small and large loops of intestines agglutinated together. I made a lateral anastomosis. In the other portions that were not so large and bleeding at the time, I resorted to a simple and better technique which I have carried out for many years; that is, I took dermatol or subgallate of bismuth and packed it over the part until it stopped the oozing. I then took a pitcher of water and poured it over that, which enabled it to stick. It will remain there like a crust similar to that produced by the ligature cautery. You can turn the bowel in and any adhesions will take the place of that crust of subgallate of bismuth.

I wish to report two cases in which, if I had resorted to the exclusion method, I would have saved them, but lost both. I feel it incumbent upon me to put before you my failures as well as successes. I have excluded the bowel now in sixteen cases, mostly chronic cases. I will refer briefly to one or two of them.

The first patient was an attorney from Texas, who had chronic appendicitis. When I reached the appendix the condition I found can be fittingly described as an appendicitis obliterans; but a good deal of the bowel was obliterated. It appeared to be hopeless to leave a large mass in the right iliac region. If I had, however, switched that off I would not have lost my patient from shock, which continued with a low suppuration following. I lost him because I did not switch it off.

Another case was that of a brother practitioner. He was forty-five years of age, and had chronic appendicitis. I removed the entire cecum with the obstructed portion of bowel, and he died on the fifth day from shock. He might possibly have recovered were it not for the fact that his associate gave him large doses of morphine. He suffered so much that he contracted the morphine habit, and large doses of the drug did not help him very much. If I had switched off a portion of the bowel in this case, after having removed the appendix, which I failed to do, I have no doubt the man's life might have been saved.

Dr. Brown (closing).—I am inclined to believe that strangulated hernia is a disgrace to surgery. I quite agree with the gentlemen who have spoken that, wherever it is possible to do a complete operation primarily, it should be done. I have discussed this matter very fully, reporting twelve cases of gangrenous hernia in which I resorted to primary bowel resection, and advocated this operation at a meeting of the American Association of Obstetricians and Gynecologists. It was to call your attention to the methods that should be resorted to in the restoration of bowel continuity following artificial anus, that I presented this paper. The cases r ported accentuate the value of intestinal exclusion.

I cannot agree with Dr. Mayo that the Mikulicz operation offers any advantage whatever over the procedure outlined. I think that operation is blind and unsatisfactory, at least it has been in my hands, and the ease with which I have been enabled to restore bowel continuity, by the method I have described, has made me think a good deal of it.

In regard to removing the bowel that remains, I tried to bring out in my paper that we should not disturb the adhesions that Nature has brought about there with a view to curing the hernia. By doing exclusion and cutting all loops of bowel high up, excluding them, leaving two gloved fingers, and a gun barrel, there will be eversion of the mucosa, which we can remove either by clamp or cautery. In inguinal hernia of which I spoke, the conditions are satisfactory. If I had made an effort to remove the bowel by loosening up adhesions, at the secondary operation, while I could have gotten the bowel out, I am confident it would have brought about a condition which would have been worse than if I had allowed the bowel to remain. In the umbilical hernia case, it would not have been proper to have loosened up the umbilical ring. That patient weighs 280 pounds, and the umbilical hernia is practically cured. She has two small mucous protrusions marking the opening of the two ends of the bowel. If I had loosened up the ring and had attempted to remove the large mass of mesentery and broken up the adhesions there, I am confident I would have killed her. We cannot get ideal results in conditions of this character, but if we are able to restore intestinal continuity and to relieve these patients from horrible fecal leakage, which accompanies artificial anus, we shall have accomplished a great deal. I believe firmly that this method is the one that should be resorted to, and I also believe that the cases in which artificial anus is necessary are the exceptions.

THE REPORT OF EIGHT CONSECUTIVE CASES OF GUNSHOT WOUND OF THE ABDOMEN, WITH ONE DEATH.

By Le Grand Guerry, M.D.,
Columbia, S. C.

We wish it understood at the outset, that in this report we make claim neither to novelty nor originality; we plead, in part, excuse for our justification of two facts, namely: (1) That by action of our Council each member has to write a paper once in every three years; and (2) that only one of these eight consecutive cases was lost.

Case I.—Male, white, aged thirty-two years, a well-nourished and perfectly healthy young man; as the result of a Fourth of July quarrel was shot in the abdomen with a 0.38-caliber pistol; the ball entered about three inches below the ensiform cartilage and on the left side; the course was upward and backward. After receiving the injury he stabbed his assailant in the spinal cord, severing it, and then walked one-half mile. Patient was brought to the Columbia Hospital twelve hours after injury; laparotomy was performed at once; the ball penetrated the duodenum in two places, and there was extensive hemorrhage; operation consisted in repair of two perforations and removal of the blood and draining, both from the local point of damage, and one stab wound just above the pubic bone into Douglas' cul-de-sac; patient returned to bed with pulse 120, and in good condition; recovery prompt and uneventful.

Case II.—Male, white, aged fourteen years, was accidently shot in the abdomen by a 0.32-caliber rifle; the ball entered in the median line about three inches below the umbilicus. Patient was seen by me five hours after injury; his condition was only fair with pulse 120; laparotomy was performed at once, and five perforations of the small intestines were repaired; abdomen was thoroughly irrigated, as to be described below, and a stab wound for drainage in each flank and a drain placed above the pubic bone into Douglas' cul-de-sac. Patient returned to bed with pulse 140; storming time for thirty-six hours, but recovery complete.

Case III.—Male, colored, aged twenty-eight years, was shot with a 0.38-caliber pistol obliquely through the abdomen below umbilicus and two inches to the right of the median line; was brought forty miles to the colored hospital seventeen hours after the injury; pulse, 130; respiration, 29. Immediate operation through median incision; twelve perforations of the small intestines, and considerable hemorrhage. Repair of perforations, thorough irrigation, and drainage from each flank and above pubis in cul-de-sac of Douglas. Pulse on returning to bed 140; recovery.

Case IV.—This case is, on account of the number of perforations, age of patient, and condition of peritoneal cavity, of unusual interest. Male, white, aged twelve years, very small for his age, was injured by the accidental discharge of a 0.22-caliber parlor rifle; the ball passed completely through the abdomen, transversely, just below the umbilicus. Owing to my absence from the city he was not operated on until twenty hours after the accident; his condition at the time of the operation was surprisingly good; pulse, 115; temperature, 101°; respiration, 24. Incision in median line below umbilicus; eighteen perforations of the small intestines, and two of the ascending colon. Repair of perforations, thorough irrigation, and drainage as before mentioned; there was considerable hemorrhage; recovery prompt and complete. Here was a case of a very small abdomen with twenty per-

forations, and the operation twenty hours after injury, with most extensive soiling of the peritoneal cavity.

Case V.—This patient was a colored man, aged twenty-nine years; 0.34-caliber pistol wound just above umbilicus, ranging downward and behind; there were eight perforations of the small intestines; operation eight hours after injury; very little hemorrhage. Was shot before breakfast.

Case VI.—This case can be described as Case V, since the only material difference was in the fact that Case VI had ten perforations and was shot after breakfast; both were well-nourished and vigorous men, and both were under the influence of alcohol at the time of the shooting. Pulse in each case about 90, temperature 100°, with practically no shock; both cases were operated on as above described; both recovered. One was shot eight and the other ten hours before the operation.

Case VII.—A young colored woman, aged twenty-two years, was shot transversely across the abdomen with a 0.44-caliber pistol. This case was brought forty-five miles to the hospital, and seen by me eighteen hours after the shooting, operation taking place one hour later. Pulse, 140; temperature, 101°; respiration, 32; shock pronounced. At operation found twelve perforations of the small gut and two of descending colon; median incision, thorough irrigation, repair of perforations and drainage as already mentioned. This case died six days after operation. Autopsy was not allowed.

Case VIII.—Male, white, aged thirty years, a deputy sheriff; was accidently shot from behind by his pistol, a 0.44-caliber Colt's weapon, falling out of his hip pocket; the ball passed through the lower lobe of the right lung, right lobe of the liver, and grazed the hepatic flexure of the colon, not actually cutting through the mucosa. This case was seen seventeen hours after the accident, and was in an alarming condition from hemorrhage; the abdomen, as well as the pleural cavity, was filled with blood. Pulse,150; temperature, 98°, by rectum. Immediately on starting the operation the

patient was given a pint of normal saline intraveneously: bleeding was coming largely from the liver wound, which was sutured; the tear on the intestine was repaired, abdomen irrigated, and blood removed; drainage to site of intestinal injury, and gauze packing around the liver wound. Patient rallied and recovered.

We now wish, very briefly, to outline the method employed. For the sake of brevity, certain important points in the management of these cases were omitted in the individual report so that we could speak of them here. In the first place, whatever knowledge we may have of emergency abdominal surgery must be at hand and ready to wear. I am convinced that the hardest lesson to learn is when to stop; cases that I have lost previous to this series were due to the fact that too much was being done. That surgeon is a good surgeon who knows when he is doing harm and will stop. The late Dr. Homans, of Boston, once said: "That nine men out of ten know what to do, but the tenth man knew what not to do, and he was the man."

Length of Operation. These operations should be done just as quickly as is commensurate with thorough work, and no quicker; far be it from me to decry the rapidity that comes from dexterity and knowledge, but from some of the discussions that take place, and from some of the articles we read, one would think that the only thing connected with any operation was to get through in five minutes.

These patients were all brought directly to the operating-room; if no morphine had been given they were given $\frac{1}{8}$ to $\frac{1}{4}$ grain as seemed best (hypodermically); they were warmly wrapped and the cleaning of the abdomen began immediately with administering ether; the advantage here being that the instant the patient was asleep the incision was made—fifteen to twenty minutes of time is saved here.

In every case, as soon as the operation is begun, the patient is given either intravenously or subcutaneously, according to the indications, one pint of normal salt solution, with or

without adrenalin, the temperature of the solution being 115° to 120°. This is the routine procedure with us in all operations when shock is present, and even when it is likely to occur.

Unless contra-indicated we always use the median line incision as giving access to a greater space than any other.

In all these cases, save the first one, thorough irrigation of the abdominal cavity with salt solution was employed; we use the Blake two-way irrigator, as by its use we lose no time and the work is thoroughly and accurately done. Just as soon as the abdomen is opened and irrigation decided upon, the irrigator is introduced and kept going throughout the operation; an assistant changes, from time to time, the position of the instrument to insure thorough cleansing.

Next a rapid search is made for any bleeding point, which is controlled, and then a careful search is made for the perforations, and this entails inspection of most of the intestinal tract; the coils of gut are received on warm abdominal pads, and each perforation is clamped as found. When we are satisfied that all perforations are found, the uninjured gut is rapidly returned after being cleansed with salt solution; the perforations are then repaired and the wound closed. If there is any segment of gut of doubtful vitality, it is brought into the wound and a strip of iodoform gauze placed on each side. We had recourse to this expedient in Cases III and IV; sometimes resection of the gut is conservative.

Drainage consists of a cigarette drain of iodoform gauze and protective tissue; we ordinarily place a drain in each flank and into the cul-de-sac of Douglas.

Every case in this series was placed in the exaggerated Fowler's position; we have been able to get this position most satisfactorily by using an ordinary roller chair, the back of which can be raised or lowered at will. Unless the location of the perforations prohibit, we use salt solution in the rectum as advised by Murphy.

We submit the above, gentlemen, for your consideration

with the knowledge that while it contains much that is bad, we cherish the hope that you will find no more than the usual amount of unreasonableness.

DISCUSSION.

Dr. Randolph Winslow, of Baltimore.—This paper is one of great interest. The results are extremely good, as good or better than any that have been reported up to this time.

It has fallen to my lot to have had quite an experience in gunshot and stab wounds of the abdomen extending over a period of a good many years. The first operation I had occasion to do was performed in 1895. I have had in my service thirty odd cases. The principles of the operation recommended, are, perhaps, sufficiently well understood. In civil practice, if people who receive gunshot or stab wounds of the abdomen, with penetration of the intestines, are allowed to go without operation, they die. It may be that in a few cases, by some rare good fortune, some of them recover, but recovery is excessively uncommon without operation. In recent military surgery, with small missiles going with enormous velocity, it has been found that the mortality is nothing like so great, and upon the battlefield, or in those cases occurring where it is impossible to get the patients at once to a place where they may be operated on, better results have followed non-operative treatment. In the Boer war, where everything was exceptionally foul and dirty, water scarce, and flies abundant, and infection almost sure, it was found much better to place a protective pad upon the abdomen and let the patient alone. That may be all right in South Africa for the Boers or Englishmen; it may be all right in the Japanese service, but it is all wrong in Baltimore, and doubtless in Columbia, S. C., and if these patients are not operated on they are going to die. In short, the mortality will be almost 100 per cent. The quicker these patients are operated on, as the essayist has said, the more likely they are to recover, but I am cognizant of the fact, however, that a case is not to be despaired of even though twenty-four hours or more have elapsed. If a person is shot in his belly from in front, or

laterally, lateral wounds being more dangerous because they are liable to make more perforations, the indications are absolute and clear to operate. There can be no getting out of it. The cases that are most difficult to treat and which, in my experience, are frequently followed by mortality, are those not shot from in front, but shot through the ribs, the bullet or missile penetrating the pleural cavity or the lungs, and usually going down into the abdominal cavity, often not only fracturing a rib or ribs, lacerating the lung, perforating the diaphragm, puncturing the liver, but going through the stomach and making wounds in places that are practically inaccessible.

Any wound from behind will be a serious one, because it is more or less difficult to know whether the bullet has penetrated the abdominal cavity, or whether it has not. I wish to simply say that any wound of the thorax below the fifth rib should be considered abdominal, unless there are clear symptoms indicating that it is not an abdominal, but a thoracic wound, and that any gunshot wound of the back which gives us a fair suspicion that the bullet may have entered the abdominal cavity, demands an exploratory laparotomy.

Dr. C. E. Caldwell, of Cincinnati.—I wish to mention one thing, but do not know whether attention has been called to it or not. I reported cases of this nature to this Association some time ago, and one point I would lay special stress on is the fact that occasionally a bullet will seem to have entered the abdominal cavity, cause symptoms of penetration, and yet it has been found not to have done so. In one such case I had, on cutting down in the right hypochondrium, and finding no evidence at all that the bullet had penetrated the abdominal cavity, I found it had penetrated the fascia, with absolutely no evidence of the track of the bullet. Notwithstanding that I cut through the fascia, went down and found the bellet lying directly upon the peritoneum, but not having penetrated it. It was picked up and the necessity of opening the abdomen done away with. It is a good plan in these cases, if possible to trace the bullet, to make the incision in the track of the bullet, and follow up the bullet in many instances, if you can, and find out for yourself whether it has entered the abdominal cavity or not before making a laparotomy in further search for it.

Dr. John Young Brown, of St. Louis.—I wish to congratulate the essayist on his splendid paper, and to concur in

almost everything he has said. The mortality in gunshot wounds of the abdomen depends largely on the character of the cases. The simple penetrating wounds without perforation get well whether operated on or not. They should be operated on because it is absolutely impossible to tell a simple penetrating wound from one that is not only penetrating, but perforating. There are many cases of perforating wounds of the abdomen where the patients gave no symptoms, the reason being that there was very little hemorrhage and comparatively no shock. These cases of simple multiple perforations, where hemorrhage has not been profuse, and where they reach the operating-table and are operated on early, give a low rate of mortality. I have been amazed at the results I have secured in this character of cases. Most of them have recovered. I have had a series of complicated cases, with case after case of death, the mortality being largely due to the complications that were present, as was called to your attention by the gentlemen who preceded me in the discussion. If we have a penetrating wound of the abdomen, the penetration going through the lung, diaphragm, liver, and intestines, the mortality rate is very high.

There is one point in regard to the technique I would like to call attention to, and that is the importance of a routine method of search. I do not believe in completely eviscerating these patients and searching for gunshot perforations, but if we examine the stomach, the transverse colon, and pick up the jejunum at the angle of Treitz, as in a gastro-enterostomy, we can follow the small bowel down to the ileocecal valve, with a minimum amount of exposure, and repair the perforations as we see them. It is exceedingly important that a thorough search should be made, for if we sew up six holes and leave one the patient will undoubtedly die.

There is another point that I think we civil surgeons should combat, namely, the deductions that have been drawn from the statistics of military surgeons. In those cases of penetrating and perforating wounds reported by military surgeons, the patients having recovered without operation, I think the diagnosis should be questioned. In quite an extensive experience in work of this kind I am inclined to believe that the diagnosis of a perforating wound of the abdomen, one that penetrates the bowel, cannot always be made without an exploratory laparotomy, except in exceptional instances

and the recoveries that follow non-operative treatment in so-called penetrating wounds of the abdomen should be taken with a grain of salt, as I do not believe the wounds were perforating. At any rate such statistics should not be used as arguments in favor of the expectant plan of treatment of cases that occur in civil practice. There are people dying all over the country from gunshot wounds of the abdomen because of the neglect of surgery, and if we wait for symptoms to develop indicative of perforation, we operate in the presence of peritonitis, and my experience has been that the mortality in such cases is fully 100 per cent.

Dr. George A. Herndon, of Louisville.—As illustrating some features in connection with this subject, I should like to call the attention of the Association to one case that came under my observation a short time ago. A man was shot three inches below the umbilicus, and one inch to the left of the median line. The ball appeared to enter at right angles to the perpendicular plane of the body, and he was operated on by me in about three or four hours after the reception of the injury. On opening the abdomen I found quite a large quantity of blood in the peritoneal cavity. After careful search we could find no injury to the intestine. The ball was not sought for. The man made perfectly plain progress, and in about two weeks was out of bed. He was preparing to go to his home twenty miles distant, when, all of a sudden, he was unable to pass water, it requiring the use of a catheter to withdraw the urine. He had a chill; the temperature went up high, and bulging was discovered in his perineum. This region was promptly invaded, and a large abscess evacuated. He died three days later. Autopsy disclosed the ball embedded in the ischium on the same side in which it had entered. The wound of the bladder was found, a virulent type of peritonitis had become established, attacking the peritoneum on the posterior surface of the bladder and throughout the pelvis.

Dr. R. M. Cunningham, of Ensley, Ala.—As illustrative of the points made by Drs. Winslow and Caldwell in regard to the difficulty of ascertaining whether or not a ball has entered the abdomen or not, I desire to report this case: A negro was shot by a policeman; the bullet was 0.38 caliber; the distance forty feet. The bullet entered the right buttocks. The patient was brought immediately to the colored depart-

ment of my private hospital. There were apparently no symptoms. Patient did not complain of pain; there was no shock. The difficulty with him was that he was under arrest. A bullet probe passed into the wound passed forward external to the thigh in the direction of the anterior aspect of the thigh. No tenderness or bullet could be ascertained. He went home and two days afterward I was sent for; he had general peritonitis, and died promptly. Under the direction of the coroner a postmortem examination was made, and it was found that the bullet had entered the great sacrosciatic notch or foramen, had passed through the ileum at its junction with the cecum, had made five holes in the upper end of the ileum, had entered the transverse colon through one wall, and was found lying loose in the colon. That led to the position of the patient when shot. The policeman testified that he, the patient, was leaning over in this position (indicating by bending over). If a man is shot in the buttock when he is bending over, make a laparotomy.

Another case illustrative of this question was a street-car conductor, who was shot in the back in the upper lumbar region. There was profound shock in that case. I could not introduce a probe into the wound more than an inch. The wound was not enlarged. The patient objected. The assistants prepared him for a laparotomy. At about the time he was shot the car ran over a boy and killed him, and he was very much excited, so that I came to the conclusion it was mental shock and not physical. No operation was made. He was out in three days.

In regard to cases getting well without operation, permit me to cite this case: A negro was shot in the back. The diagnosis at the time was that the bullet had entered the pleural cavity and had passed through the liver and the upper end of the kidney. A diagnosis of kidney wound was made from the blood appearing in the urine. The bullet did not come out in front. He was put to bed, given morphine, Nature given a chance, and he got well.

This case shows that these patients can get well, if shot in the abdomen, without operation, even where the liver or kidney is wounded. The bowel was not wounded in this case. I subscribe to the doctrine that in every case of wound of the abdomen by a bullet we should ascertain whether or not the bowel or other visera has been wounded, although my

record has been death in every such case. It is the right thing to do, and the statistics submitted by the essayist are fine, and I shall try to do better next time.

Dr. James A. Goggans, of Alexander City, Ala.—I wish to commend the technique advised by the essayist; but to say that in wounds of this kind the result depends very largely upon the organ that is injured, whether the wound is produced by a missile or knife, and if one-half, for instance, of a series of cases should recover, it is largely due to the exact character of the wounds.

In the last two years I have treated three cases without operation, and all three recovered. I have seen several others in which no operation was done.

I have done two operations for gunshot wounds of the stomach. In one there were two wounds in the stomach: one in front and one behind, with seven wounds in the intestines. In the other there was one stomach wound and nine of the intestines. In one of the cases the abdomen was full of blood, while in the other there was a badly lacerated mesentery. Both of them were greatly shocked from the loss of blood.

Dr. Alexander Hugh Ferguson, of Chicago.—While my experience with gunshot wounds of the stomach has been limited, that of gunshot wounds of the abdomen has been quite extensive. I wish to speak of a method of determining whether or not the peritoneum has been penetrated. I would suggest that the track of the bullet wound be injected with methylene blue, and as soon as you open the abdomen in front, if there is perforation, you will see the methylene blue on the peritoneum. I have used methylene blue in following fistulous tracts with great advantage, and have applied it in two cases of gunshot wounds. In one case the bullet had not penetrated because I found no methylene blue inside the abdominal cavity, consequently I did not continue the search for the bullet holes. The patient got better. In the other cases we found two wounds of the large bowel and repaired them.

Dr. Guerry (closing).—I have very little to say, other than to thank the Fellows for the liberal discussion they have given my paper. I wish to say this, however, that I have not advised any particular technique. I am not drawing any conclusions. I did not say that this is the only way, or that this was the right way, to treat these cases. I simply pointed

out that the technique I have described was employed with the results I have given.

We often hear a great deal about drainage. I drained all of these cases. The other side may be right, but I do not like to close an abdomen, in the presence of a virulent infection, without drainage. All of these cases were drained as a part of the technique, with an opening through each flank. The patients were put in the exaggerated Fowler position, and a wound above the pubes, with stab drain there. I certainly appreciate very much the discussion on my paper.

THE MECHANISM AND CLINIC OF PULMONARY EMBOLISM.

By Willard Bartlett, M.D.,
St. Louis, Mo.,
and
R. L. Thompson, M.D.,
St. Louis, Mo.

Considering the fact that it was not until the first quarter of the seventeenth century that the circulation of the blood was established, it is not surprising that over two hundred years more should have elapsed before it occurred to anyone that this flowing stream could act as a means of transportation for solid particles set free in its current, and that such particles introduced into the blood might be found in some place other than the point of entry. It was not until the time of Virchow, to whom were left so many problems for solution, that a clear conception was given us of such phenomena as metastasis and embolism.

So simple is the mechanism of thrombosis and embolism, as it is taught today, that we wonder why it was necessary for Virchow to establish the self-evident fact that injury to a vessel, or changes in the blood sufficient to cause a clotting at some particular point, might be followed by dislodgement of a piece of this solid clot and that this broken-off mass might be carried on by the blood stream until it reached a vessel too small for it to pass through and then stop. It is also plain that the blocking of a vessel by this solid mass can stop the circulation through this vessel and give rise to disturbances

of great importance, or of little importance, depending on whether or not this vessel supplies an organ, the function of which is necessary to maintain life. It is also simple to understand that this process of thrombosis and subsequent embolism is most common in the venous system, because here the circulation is slower, the walls of the vessels are thin and, therefore, most easily injured, and the valves aid stagnation. It is also plain that to the surgeon the most frequent cases of thrombosis should follow operation in neighborhoods rich in venous blood, either because of infection through the thin-walled veins from the diseased focus or from the trauma of the operation, and that masses of clot detached from such thrombi should pass from the involved veins through the venous system to the right heart, and from the right heart to the pulmonary artery and the lungs. The result of lodgement of an embolus in the lung depends upon the size of the embolus and its consequent resting place. Small emboli obstructing minor branches of the pulmonary artery cause infarcts which are hemorrhagic in character and which may or may not give rise to clinical symptoms worthy of note, depending on the size of the occluded vessel.

In this paper we desire to discuss especially the instances in which venous thrombosis, in either medical or surgical cases, is followed by emboli of sufficient size or number to block completely the more important branches, or the main stem of the pulmonary artery and cause sudden death. (It should be remembered, however, that this is not the only danger from pulmonary embolism the surgeon has to fear, for minute capillary embolism of the pulmonary artery from a septic postoperative thrombus, in no way interfering mechanically with respiration, may give rise to abscess, gangrene, or bronchopneumonia.)

These cases, which we are to discuss, of complete blocking of the pulmonary artery by large masses of clot derived from a thrombus in a vein, often encountered by the surgeon near the operative area and which may result in death, are by no

means uncommon. They occur most frequently between the second and fourth weeks following the operation. The patient may die instantaneously, or there may be a more or less prolonged respiratory struggle ending in death. This depends on whether the detached mass goes through the right heart intact in sufficient size to completely block the stem of the pulmonary artery, or whether the first mass partially blocks the artery or blocks one of its main divisions and is followed by other masses or by coagulation of blood behind the main mass. If the trunk of the pulmonary artery is blocked so that both the main branches are closed, death ensues immediately. In individuals suffering from weakened heart action, of any cause, sudden blocking of one of the main branches of the pulmonary artery may also result in sudden death. Strong heart action, on the contrary, may overcome the effect of the blocking of one of the main branches of this artery, and the patient survive.

The autopsy findings in these cases, so far as the lungs are concerned, are scant. Occlusion of the trunk of the pul. monary artery does not give rise to infarction of the lungs- This is present only when emboli have lodged in the smaller branches of the pulmonary artery. Cases are seen in which small emboli have preceded the final lethal embolus and caused hemorrhagic infarction, but these infarctions have no immediate part in causing death in such an instance. Only rarely are they found in connection with the type of pulmonary embolism with which we are dealing, and then usually when there is thrombosis of several veins at the operative site. Any of these thrombi may give rise to emboli and a small embolus might have been carried to the lung at any time from one of these thrombi wholly independant of the embolus that caused death.

In autopsies on cases of death from pulmonary embolism, the pulmonary artery should always be opened in situ before the heart is removed or cut into, as the site of the embolus is usually at the point where the vessels are cut in removal of the

heart. If this is not done the embolus, which may have had no time for attachment, can easily slip out unobserved and be entirely overlooked by the pathologist.

The origin of the embolus, while it might come from any part of the systematic venous system or the right heart, is most frequently found in the veins of the lower extremities, in the deep epigastric and pelvic veins, or in the mesenteric veins. In our medical cases the thrombus was found the most in the right heart.

Albanus gives as prevailing causes for thrombosis after laparotomies, sepsis, heart imperfections, pressure of tumors, etc., on veins, cooling and handling of bloodvessels while the abdomen is open, the effect of narcosis on the heart, the recumbent position, and the pressure of a bandage. He overlooks what we believe to be a most fruitful cause of the condition, varicosities on veins which are directly affected by the operation. On the operating table it is not uncommon to see greatly changed veins carrying the blood from large tumors, and in one instance, at least, No. 2 of our series, we were able to demonstrate both at operation and autopsy these varicose veins and their causal relation to fatal embolism.

All lung symptoms, according to Gussenbauer, which arise after the release of incarcerated hernia, are to be regarded as embolic in nature. Other surgeons go equally far in connecting this subject with abdominal surgery. I have heard the Mayos state, when resecting the stomach, that they invariably cauterize the cut edges of that viscus to prevent septic pulmonary embolism. Since doing this they see pneumonia following such operations less frequently than formerly. As Albanus, quoted above, states sepsis is naturally to be thought of as a factor in these cases, hence, one is not surprised at the remark of Sonnenburg, that 5 per cent. of all appendix operations are attended with thrombosis somewhere in the vicinity.

The reason for the greater number of cases given in the literature as originating from situations previously mentioned,

as far as the surgeon is concerned, is due to the fact that pelvic and abdominal operations are much more frequently performed than operations in other parts of the body. Operations elsewhere, where veins are subject to trauma or infection, are as apt to be followed by thrombosis and subsequent pulmonary embolism as they are in the before-mentioned situations. This may be illustrated by the following case:

July, 1905. Male, aged seventy years. Larynx removed for carcinoma. Eight days later sudden death. Autopsy four hours after death showed the trunk of the pulmonary artery occluded by a partially organized blood clot 1.5 cm. in diameter. The clot extended into both the main divisions of the artery. The lungs were edematous and congested. The right heart was distended and filled with blood. The neck was swollen and edematous. Operation wound at site of larynx showed some superficial necrosis with healthy appearing granulation tissue below. On the right side the internal jugler vein was distended to a diameter of 3 cm., and was occluded by a solid, grayish, granular thrombus for a distance of 8 cm. The neighboring tissue was stained by blood pigment. Anatomical diagnosis: thrombosis of internal juglar vein with resulting occluding embolism of pulmonary artery.

The frequency of pulmonary embolism (including the cases of embolism of the smaller branches of the pulmonary artery that give rise to little or no permanent after effects), is much higher than is usually supposed in both surgical and non-surgical diseases.

Virchow found that in 10 cases of thrombosis of the veins of the lower extremity, 6 were followed by pulmonary embolism. Albanus found that 43.4 per cent. of the cases showing thrombosis after laparotomies, were followed by pulmonary embolism. (This amounted to only 2 per cent. of the operated cases, since only 53 cases of thrombosis were found in 1140 laparotomies; 23 of which were followed by pulmonary embolism.) On the contrary, Quenstedt and also Leichten-

stern found pulmonary embolism in 20 per cent. of their cases of thrombosis. Opposed to this, again, is the record of Lubarsch, who in 584 cases of thrombosis found pulmonary embolism 347 times, *i. e.*, in 59.1 per cent. of his cases.

In none of these instances is it stated how frequently the embolus was of sufficient size to cause death by blocking the pulmonary artery. The latter cases are not rare, however, and from those that have been reported a few may be cited.

Welch has collected 23 cases of venous thrombosis in which there were at least 3 deaths due to pulmonary embolism consecutive to the thrombus. Mynter mentions a case in which sudden death was probably due to pulmonary embolism following thrombosis of the femoral vein in appendicitis. Robinson describes a typical death from pulmonary embolism seventeen days after hysterectomy. Koenig reports a case where the patient died from pulmonary embolism, although the thrombosed vein (saphenous) had been removed for the purpose of avoiding just such an untoward outcome. In this instance the clot probably extended into the femoral vein and was, therefore, not totally extirpated.

From the cases that have occurred in the practice of one of us, and from cases that came to autopsy at the Boston City Hospital, most of them during the service of Dr. Thompson, and for which we wish to express our indebtedness to Dr. F. B. Mallory, we append the following list:

1. Carcinoma of larynx (autopsy, Thompson). Death instantaneous, eight days after operation; occlusion of main stem of pulmonary artery by embolus; thrombosis of internal jugular vein.

2. Myoma of uterus (autopsy, Thompson). Death sudden, thirteen days after operation; occlusion of both branches and trunk of pulmonary artery by embolus; thrombosis of ovarian veins.

3. Compound fracture of leg (autopsy, Thompson). Death thirty minutes, eight days after injury; main trunk and right

pulmonary blocked by embolus; thombosis right heart; culture from heart's blood sterile.

4. Contusion of knee (autopsy, Dr. Duval). Time in dying thirty minutes; embolus of trunk and branches of pulmonary artery; thrombosis of right femoral.

5. Appendectomy (autopsy, Dr. Brinckerhoff). Death in five minutes, eight days after operation; complete embolism of main trunk of pulmonary artery; abscess at appendix site.

6. Gangrene of heel; myocarditis; alcoholic neuritis (autopsy, Dr. S. B. Wolbach). Eleven hours in dying; embolism of branches of pulmonary artery except branch to upper lobe of right lung; thrombosis of femoral, external pudic, and profunda; culture from heart's blood sterile.

7. Appendectomy (autopsy, Dr. Marchildon). Died in ten minutes, fifteen days after operation; occlusion of both branches of pulmonary artery by embolus; thrombus not found.

8. Clinical diagnosis, uterine myomata and gallstone disease. She was operated upon and a uterine tumor as large as a cocoanut treated by myomectomy. Through a separate incision the gall-bladder, thickened and full of stones, was removed. Six days later she suddenly went into a condition of shock from which, however, she rallied; but four days later there was another attack of similar nature only somewhat less pronounced, and in two more days, that is, two weeks after the operation, she experienced for the third time the characteristic symptoms of pulmonary embolism and was dead in thirty minutes. An autopsy performed by Dr. Tiedeman substantiated the diagnosis.

9. Clinical diagnosis: hemorrhagic pleurisy (autopsy, Dr. Brinckerhoff). Autopsy findings scant save for thrombosis of left pulmonary and popliteal arteries; embolism of right pulmonary; death sudden; culture from thrombus show colon-like bacillus.

10. Tuberculosis of lungs (autopsy, Thompson). Embolism of left pulmonary artery; two hours in dying; cultures from heart's blood show streptococcus.

11. Bronchopneumonia and acute otitis media (autopsy, Thompson). Embolism of both branches of pulmonary artery; five hours in dying; culture from heart's blood sterile; middle ear shows Streptococcus and Staphylococcus aureus.

12. Typhoid fever (autopsy, Dr. E. E. Southard). Complete blocking of pulmonary artery by embolism; death in fifteen minutes; thrombosis of right common and internal iliacs.

13. Myocarditis; aortic endocarditis; hypertrophy and dilatation of heart (autopsy, Thompson). Embolism of branches of pulmonary artery to lower lobes only, with hemorrhagic infarction; twelve hours dying; thrombosis of right heart. (Death in this case due to weak heart, as embolism not sufficient to cause death under ordinary conditions.)

14. Similar to last case. Myocarditis; hypertrophy and dilatation of heart (autopsy, Dr. H. A. Christian). Embolism of branches of pulmonary artery with hemorrhagic infarctions, both lower lobes and upper left lobe of lung; death sudden; thrombosis of right heart.

15. This patient experienced all the typical symptoms of pulmonary embolism with sudden death, as did those whose records succeed this one except two to be mentioned later. Patient No. 15 was operated upon for a large umbilical hernia, and at the same time the Talma operation for cirrhosis of the liver was performed. Eleven days after the operation he suddenly became breathless, blue, and in ten minutes was dead. No autopsy could be obtained in this or the succeeding cases, hence they are submitted not as proved instances of pulmonary embolism, but as suggestive cases in surgical practice in which a better explanation for death cannot be given.

16. A woman, aged fifty-six years, was operated upon by the Wertheim method for cancer of the uterus. No unusual features marked her convalescence. She was up on time, and when preparing to go home, four weeks after the pro-

cedure, suddenly dropped to the floor while crossing the room, gasped for breath, and was dead in thirty minutes.

17. A man, aged sixty-eight years, suffering from cancer of the stomach, underwent a resection without shock or subsequent ill-effects for three days. He was sitting up in bed talking to his nurse, having taken liquid nourishment, and being entirely without abdominal symptoms, when suddenly he became unable to get his breath, as the nurse related, dropped back deeply cyanosed, and died a few minutes later.

18. Another Wertheim operation for cancer of the uterus done on a woman, aged forty-four years, resulted in sudden death in very much the same way. Ten days after the operation she was sitting up in bed, having just partaken of a light lunch, when suddenly she began to breathe with great difficulty, extremities became cold, every evidence of extreme shock had appeared by the time I saw her, an hour later, and in eleven hours more she was dead.

19. An operation for umbilical hernia on a woman, aged fifty-two years, was attended by a somewhat similar set of symptoms, but resulted favorably. Eight days after the Mayo overlapping operation there was a sudden onset of the manifestations just related, and her condition quickly became so desperate that by the time I reached the hospital, one-half hour later, she was considered moribund. However, under the most stimulating treatment, she gradually began to breathe more easily, and in twenty-four hours was considered out of immediate danger. She gradually improved, left the hospital a month later, and has remained well ever since.

20. A man, aged thirty-eight years, was operated upon for appendicitis in the interval. The procedure was very difficult and consisted of the removal of a stiff, tightly adherent appendix. His recovery was devoid of any incident up to the ninth day, when being allowed to get up for the first time he suddenly became intensely cyanotic, breathless, unconscious, and died in a very few minutes, as the nurse told me.

21. An intestinal resection with Murphy button anastomosis was done on a man, aged fifty-four years, and two days later, while he was normal, apparently comfortable, and conversing with one of us, he suddenly gasped for breath, became blue, unconscious, and was dead within five minutes. This case was clearly one of some form of suffocation. Many experiments on animals have demonstrated the classical features of suffocation, and in this instance not one of them was missing. However, there was no obstruction in the air-passage, since a knife that happened to be handy was plunged into his trachea and one lung forcibly insufflated through a catheter; hence this suffocation can only be regarded as due to the sudden interruption of the oxygen-carrying blood stream.

22. A woman, aged forty-seven years, was operated upon for varicose veins on the lower leg. A combined Mayo-Schade operation was performed. The same evening she became suddenly cyanotic, complained of shortness of breath, pain and compression in the chest, intense anxiety was present, extremities became cold, but the symptoms rather rapidly disappeared, and, as yet, no further danger of this kind has been encountered. She is, however, still in the hospital at the time of writing.

It may be of value in the 16 surgical cases to note the interval of time that elapsed after operation or injury before the onset of pulmonary symptoms. In 2 of these this feature is not noted in the records, hence but 14 are left for our consideration. In these cases this period was as follows:

One, one day; 1, two days; 1, three days; 1, six days; 4, eight days; 2, nine days; 1, eleven days; 1, thirteen days; 1, fifteen days; 1, twenty-eight days.

An average shows that a little less than seven days intervened, as a rule, between the time of operation or injury and the lodgement of the blood clot in the pulmonary artery. It should be noted in those cases where embolism occurred a few days after operation, that the condition was such that

thrombosis may have been present some time before the procedure.

Twenty of the 22 cases cited resulted fatally. In this connection it is interesting to note the time intervening between the onset of symptoms and the occurrence of death. I give these as found in the hospital records: Three, suddenly or instantly; 1, almost instantly; 1, few minutes; 3, five minutes; 2, ten minutes; 1, fifteen minutes; 4, thirty minutes; 1, two hours; 1, five hours; 1, eleven hours; 2, twelve hours.

As far as the symptoms of thrombosis preceding pulmonary embolism are concerned, Lotheisen has very properly remarked that they very often fail entirely. However, Schachtler has made some very interesting observations, which may be of value in this connection. He had the opportunity of studying 7 such cases at Zurich, and noted that the temperature remained normal in all of them, while the pulse gradually rose in a step-like (staffelfoermig) manner until the lung symptoms became manifest. He regards this change in the pulse as indicative of thrombus formation.

The symptoms of pulmonary embolism cannot fail to be burned into the memory of one who has ever seen a patient die as a result of this accident. The seemingly normal individual suddenly becomes breathless, cyanotic, anxious, restless; complains of pain and oppression in the chest; the pupils grow wide, cold sweat pours out, and unconsciousness quickly supervenes. The pulse in many instances becomes rapid and irregular to the point where it cannot be counted at all. In one case, which we have mentioned, we had apparent complete blocking of the main trunk where symptoms of complete suffocation suddenly appeared, the pulse, as might be expected when air is instantly cut off, became slower and less compressible. The symptoms in general are analogous to those which are seen when one of the main branches of the pulmonary artery is ligated in a dog. The rapid overdistention of the right ventricle which ensues is accompanied by a lowering of arterial blood-pressure and a

tremendous rise of venous pressure. Whether cyanosis, dyspnea, and failing pulse are referable to asphyxia or cerebral anemia or interference with the coronary circulation or to all three together is, according to Welch, neither easy nor important to determine.

Unfortunately the treatment of such conditions must be largely of a preventive nature. All authorities unite in the opinion that a very strong heart may tide over an individual in whom only one branch is occluded, and, consequently, the opinion is general that every heart should be aided as much as possible by stimulation. However, not much is to be expected in most instances. In order to prevent just such accidents Mueller cites cases in which he ligated quite a number of varicose viens of the lower extremity; while Kramer split varicose saphenous veins in fifty instances and evacuated thrombi to prevent pulmonary embolism as well as the local effects of the disease. He was successful in every instance. Becker advises the removal of the saphenous vein when the thrombus has not extended into the femoral vein.

Our own suggestion, prompted by more than one of the cases above recorded, relates to varicose veins in the vicinity of abdominal tumors. Not infrequently are these seen in the female pelvis, especially in connection with myomata of the uterus. They should, if possible, be extirpated with the growth, or, at least, ligated as far out as possible toward the pelvic wall, to avoid the likelihood of thrombosis (if they are left behind) with a subsequent fatal accident of the most distressing nature.

References.

Virchow. Gesam. Abhandlungen, Frankfurt a. M., 1856.
Albamus. Beiträg. z. klin. Chirurgie, Band xl.
Quenstedt. Ref. Lubarsch, Allgem. Path., Wiesbaden, 1905.
Leichtenstern. Münch. med. Woch., 1899, No. 48.
Lubarsch. Allgem. Path., Band i, p. 211.
Welch. Allbutt's System of Medicine, vol. vi, p. 194.
Mynter. Ref. Welch., loc. cit.
Robinson. Medical Record, January 14, 1905.
Koenig. Berlin. klin. Woch., 1907, No. 39, p. 1262.

Gussenbauer. Virchow's Archiv, Band cxxiii, S. 335.
Mayo. Personal Communication.
Sonnenburg. XXXI Versammlung d. Deutsche Gesellschaft f. Chirurgie.
Lotheisen. Beiträg. zur klin. Chirurgie, Band xxxii, Heft 2.
Sachachtler. Inaug. Diss., Zurich, 1895 (Ref.).
Mueller. Archiv f. klin. Chirurgie, Band lxvi, S. 642.
Kramer. Zentralblatt f. Chirurgie, 1901, No. 37.
Becker. Berlin. klin. Woch., 1907, No. 39, S. 1262.

DISCUSSION.

Dr. J. Shelton Horsley, of Richmond.—I wish to report two cases of mine, that I feel sure died from pulmonary embolism. Unfortunately, an autopsy was not obtained in either case. One of them occurred about seven or eight years ago, and the other about six years ago. Each instance followed a suprapubic cystotomy. In one case there was a stone; in the other an obscure condition of the bladder, which could not be made out without operation. However, death occurred in both instances on or about the tenth day after operation. In one case the patient was about to get up out of bed for the first time. An orderly propped him up. He complained of indefinite pain and turned quite blue. I was near the hospital, was phoned for, and reached there just as he died. I suppose the interval of time between propping him up and actual death could not have been longer than ten minutes.

In the other case the patient was in bed and while lying down and drawing up one leg to put on his trousers, his head turned to one side and he died almost instantly. I was operating at the time, was sent for immediately, went from the operating-room to the bedside of the patient, and found he was practically dead by the time I had reached him. It could not have been more than two or three minutes from the time he turned his head to one side until he died. In both cases the usual care and precautions were taken during the operation; both cases were drained, and there was nothing extraordinary about either case. There was no particular manipulation indulged in any more than was usually done in other bladder cases. While no autopsy was obtained in either

case, the clinical signs showed clearly, in my judgment, that they can be regarded as deaths from pulmonary embolism.

Dr. Charles H. Mayo, of Rochester, Minn.—This is a most serious question, because it is one in which we are so helpless unless the surgery of the heart, performed immediately, may bring within our reach the possibility of attempting to do something for these cases in which embolism occurs. We have a good many of these cases, from time to time. In some years we have one case in six hundred, or in other years one case of embolism from fifteen hundred abdominal operations. We have not had any case of pulmonary embolism in general surgery. It is only in the surgery of the abdomen we have seen such cases. It is usually the unexpected case in which we have a sudden death. We have had a number of them get well, and if the heart will only relax and its two halves beat unevenly, and if the patients can live for the first twenty minutes, say, they will often recover. In one of our cases the chordæ tendinæ tore loose, followed by heart murmur. One of the patients is living in Rochester, and I have had occasion to see her a number of times since the accident occurred several years ago. It is impossible to locate where the occlusion of the vein has occurred at the autopsy. It is a most difficult thing because thrombosis, beginning in a small vein where it opens into a large one, will produce a clot which may hang on and almost occlude the vein, then the embolus may slip away. We had a recent autopsy in which the right heart was filled with a most peculiar clot; it looked like macaroni. The material, in many pieces, was a number of inches long and one-eighth of an inch thick, with hollow lumen and broken off in segments, simply filling the right heart full of these macaroni-like clots.

As to performing some operation on a vein because there are visible signs of thrombosis, with a view to preventing pulmonary embolism, I think it would be a questionable procedure. I have never seen the condition occur where I thought it might do so. It is an absolutely sudden, unknown, and unexpected condition that takes away these patients, and but rarely in cases in which we have the ordinary signs of phlyctitis.

Dr. Rudolph Matas, of New Orleans.—As bearing on this subject permit me to refer to a recent contribution on the surgical therapeutics of pulmonary embolism. I refer to the

report of a case operated upon by Trendelenburg, of Leipzig, and presented by him to the German Congress of Naturalists and Physicians at Dresden, September 15 to 24, 1907, and reported in the *Centralblatt f. Chirurgie*, 1907, Nr. 44. The procedure adopted by this operator deserves more than a passing notice as an illustration of the possibilities of surgery in these desperate conditions. As the discussion of the surgical treatment of these generally hopeless cases is now so opportune and Trendelenburg's contribution is so recent that it has not yet had time to become generally known, I feel justified in quoting his paper at some length. Embolism of the pulmonary artery frequently does not lead to death at once, but only at the end of fifteen minutes or some hours, the embolus at first (while loose in the pulmonary trunk or still in the right heart, or riding astradle upon the bifurcation of the artery) still permitting the passage of a quantity of blood barely sufficient for the preservation of life. Trendelenburg conceived a procedure by which he thought the embolic plug could be extracted in these cases. Based upon experiments on the cadaver, and upon animals in which embolism of the pulmonary artery had been artificially produced by way of the jugular vein, he recommends the following procedure:

"The heart is exposed by the formation of an osteoplastic wall on the left side of the sternum. The flap includes the third rib above and the sixth rib below, reaching almost up to the left sternal margin, and is formed like a trap door which opens outward toward the nipple. The left pleural cavity is opened widely by this procedure and the pericardium, after exposure, is incised longitudinally. The heart is now drawn out of the pericardial sac with the hand. Two loops of thread are drawn through the wall of the conus arteriosus with a needle at a distance of about 1 cm. apart, and ½ cm. to the right of the anterior longitudinal sulcus and about 4 cm. below the line of the semilunar valves. Between these two loops a puncture is made with a pointed knife as far as the cavity of the conus arteriosus, and this punctured wound is dilated to about ¾ cm. Through the wound a cannula, 13 mm. in width and provided with an obturator or stylet and a side outlet, is introduced into the conus arteriosus and the first part of the pulmonary artery. The blood is then aspirated with a syringe attached to the cannula. If there is a movable embolus in the pulmonary artery, it will be sucked into the syringe. The aspirator holds 50 cm. and is provided with a double stop cock, so that when

the stop cock is properly adjusted the blood is aspirated into the cylinder as the piston of the syringe is pulled out, and is driven into a lateral tube, by a separate orifice, as the piston is pushed in. The tube carries at its end a wire basket to catch the clot. (This apparatus is manufactured by Heynemann of Leipzig.) If the embolus is reached and successfully aspirated, as shown by its presence in the wire basket, the two loops of thread previously introduced on each side of the punctured orifice are crossed and tied in order to seal the wound in the heart provisionally. The cannula is withdrawn and the small heart wound is sutured."

When thrombi are placed in a vessel containing water, they are very readily caught with the "heart pump" and collected in the wire basket. This is not always an easy performance in animal experiments, because the thin wall of the pulmonary artery, in the conditions of diminished pressure in the vessel, may be sucked in and block the lumen of the canula. In order to prevent the coagulation of the blood in the apparatus, this it filled at the beginning of the operation with a solution of hirudin (leech extract) in physiological salt solution.

The only experiment performed by Trendelenburg upon the living human subject ended in failure. Unfortunately there existed an old adhesion of the layers of the pericardium in this patient's case—a woman, aged sixty-two years, with carcinoma of the bowel, who suddenly collapsed with all the symptoms of embolism of the pulmonary artery.

The heart for this reason could not be drawn out of the chest, and a laceration occurred while an attempt was being made to detach the adherent pericardium from the heart; naturally a profuse hemorrhage followed which accelerated the patient's death. The embolus, 10 cm. in length and almost as thick as the finger, was found immediately after death in the left pleural cavity where it had found its way together with the blood from the heart; whether with or without the assistance of the heart pump it was not possible to decide.[1]

[1] In a more recent paper (Centralblatt f. Chirurgie, 1908, Nr. 4) Trendelenburg reports that he succeeded in withdrawing from the left branch of the pulmonary artery of a calf, eight weeks old, weight 82 kg. (164 pounds), a piece of lung measuring 15 cm. in length and 1 cm. in thickness, the strip having been removed from another animal and purposely introduced into the venous circulation through the jugular vein, where it acted as an embolus. The compression of the aorta and pulmonary artery (for hemostatic purposes), which lasted from one to at most two minutes, scarcely affected the heart's action. The hemorrhage from the artery was inconsiderable. The animal promptly recovered and was doing well at the time of the report.

When I first read this communication I could scarcely believe that a sane surgeon would attempt to do a thoracotomy with the intention of extracting an embolus out of the pulmonary circuit while the patient was practically in a moribund condition. It is evident, however, from this report that even patients who are seemingly in the most desperate conditions may survive sufficiently long to make the performance of such a heroic procedure as this feasible. While it is not at all likely that Trendelenburg's operation may enter, in its present form, into practice, it is quite possible when we consider what has been accomplished in cardiac surgery with even the imperfect technique at our command, that as our methods improve, and, especially, as our resources in keeping up an artificial respiration with a thorax widely open increase in efficiency and simplicity, that the possibility of rescuing a certain number of these patients from a certain death is not at all visionary or impracticable, as many who are not familiar with the accomplshments of surgery in this direction might be led to believe.

Dr. Charles H. Mayo, of Rochester, Minn.—I would like to ask if statistics show any difference in the number of cases of pulmonary embolism in the experience of operators who get their patients up early, and those surgeons who let their patients lie in bed much longer?

Dr. Rufus B. Hall, of Cincinnati.—As bearing on the point brought out by Dr. Mayo, that embolism occurs not in cases of varicose veins, where we would expect it, every surgeon will recall case after case of varicose veins in the pelvis, and especially in fibroid tumors with large veins on one side, one or more of the veins being as thick as a man's thumb, without any accident or any subsequent trouble.

I can report one case of death from embolism in a woman, aged forty-two years, who was operated on for the removal of a myoma the size of an adult head, and in which there were no complications. Her convalescence was perfectly smooth. About twenty days after the operation I promised her that she could go home in a day or two, and in the night, near morning, she went to help herself to a glass of water by the bed (that was her explanation), became dyspneic, and was dead in about eight minutes. The floor nurse was at her side within one-half minute after she began to have this attack, and she was an intelligent woman and explained her condition

I live within fifteen feet of the hospital, and was called by 'phone, and went to the hospital at once, reaching there just as the woman drew her last breath. This occurred after a smooth convalescence. As I have said, there was not the least complication. This and other cases illustrate how, in many operations where we would naturally expect embolism, we do not get it.

SUPPURATIVE PHLEGMONOUS GASTRITIS, WITH THE REPORT OF A SUCCESSFUL LAPAROTOMY (PROBABLY THE FIRST) IN THE TREATMENT OF A CASE.

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Suppurative phlegmonous inflammation of the stomach wall is a condition rarely ever encountered by clinicians of even great experience. Probably the whole of medical literature does not contain reports of cases exceeding seventy-five in number.

Several writers mention the first description of phlegmonous gastritis as having been made by Borel (Opera), in 1656. It is claimed this description was of the circumscribed variety, while mention of the diffuse form of the disease was not made until Cruveilhier described it so graphically in 1861. Leith, who wrote the classical production that appears in Allbutt's *System of Medicine*, 1907, states that the first mention of the circumscribed variety was made in 1620 by Varandaeus (Tractatus de Morbis Ventriculi). Mayo Robson and Moynihan, in their comprehensive work on *Diseases of the Stomach and Their Surgical Treatment*, second edition, 1904, have published nearly all the cases that could be found in literature, and I have enough more scattering reports of cases made before and since that book was published to bring the number of suppurative cases close to seventy-five. But those authors have written upon the general subject of phlegmonous gastritis without regard to

the presence or absence of pus. In their table of 85 cases, but 63 have been proved to be of the suppurative variety of the disease. Other authors have treated the subject in this broad manner, which, after all, is probably best except from the standpoint of treatment. Even in this, should surgical means be instituted, necessity for careful distinction would not exist, particularly as pre-operative diagnosis heretofore has practically been impossible.

Synonyms. Various titles, each supported by reasons sufficiently logical for its existence, have been employed in descriptions of this pathological condition or reports of cases observed. Among these may be mentioned acute suppurative gastritis, gastritis submucosa, employed by Dittrich, Klebs, and others; phlegmon ventriculi, or gastritis phlegmonosa, by Lebert and Bamberger; linitis plastica et suppurativa by Brinton; gastrité interstitielle suppurative by Auvray, and submucous suppurative phlegmon by Krause and others. A considerable number of French observers speak of it as linite phlegmoneuse. Robson and Moynihan regard phlegmonous gastrititis as the most apt term.

Varieties. Of phlegmonous gastritis two distinct anatomical varieties are observed, viz., the circumscribed and the diffuse. Pathologically and symptomatically they might be contrasted, although operation before or after death has probably been required for diagnosis in every case reported. In no instance is a diagnosis before operation or death been authenticated, although it is claimed it was made in one of Chvostek's cases and by Dörbeck and McCaskey. In one case (Callow's) the patient vomited a pint of pus in the presence of the surgeon, and pus was found in the stools before death. In some cases, however (Deininger, Glax, Beckler, Kirchmann, and Rubner), pus is said to have poured into the stomach or neighboring organ from a circumscribed abscess in the wall and recovery to have followed. Cicatrices found in the stomach wall have been attributed by Leube, Oser, and others to the rupture of such abscesses, but this

conclusion, in the light of our knowledge of the disease, must be regarded as purely conjectural. The diffused form is the most common. Robson and Moynihan found in 85 cases they studied, that the diffuse form was found in 63 and the circumscribed in but 11 cases.

The *complications* of this disease are carcinoma of the stomach and peritonitis. It is not necessary to add that either of them would somewhat lessen the probability of recovery were such result probable.

Pathological Anatomy. The stomach wall is invariably thickened, in some cases to three-quarters of an inch. This thickening is most marked near the pylorus. In my case this fact was emphatic. The mucosa is usually smooth, having petechial and necrotic areas. In some instances small sieve-like apertures, through which pus exudes, are found. The submucosa becomes infiltrated with pus to a greater extent in the diffuse than in the circumscribed form, and from the cut section of the stomach wall pus exudes under pressure. In the circumscribed the pus may be localized in one large abscess or several small ones. The muscular coats sooner or later become involved by the process and become infiltrated with pus. The serous coat may not escape, and perforative peritonitis results. This process is so rapid that it is practically never limited by adhesions, but becomes rapidly general. Thrombosis of the veins of the liver, lungs, and stomach may be present, and acute pleurisy has been observed.

Etiology. The disease is purely one of acute virulent infection. The most frequently met microörganism is the one always present in phlegmonous inflammation—the streptococcus. The colon bacillus, the staphylococcus, and other organisms are not uncommon invaders. The gas bacillus was probably present in a few cases. Mixed infection appears to be quite the rule rather than exceptional. The disease may arise suddenly and primarily in perfect health with no preceding malady constituting the so-called idiopathic variety,

which is by far the most frequent, or it may be a sequel of some chronic or slow form of infection by metastasis, or result from recent or remote trauma. Cancer of the stomach and of the esophagus are not uncommon precursors. Osler mentions having seen the disease in two cases of gastric carcinoma. It is found as a complication of puerperal sepsis and typhus fever. Leith conveniently classifies the etiology of this disease under the following six heads: (1) sex; (2) age; (3) alcoholic excesses; (4) dietetic errors; (5) injury; (6) blood poisoning. In the cases numbering about seventy in which the sex is given, the male sex has been attacked in about 80 per cent. of them. Leube in Ziemssen's *Cyclopedia* found that of 26 cases, but 5 of them occurred in women.

No age seems exempt from this disease. Hun's case, which occurred in a girl, aged ten years, is the youngest I found recorded. Leith found in 65 cases: Five occurred between the ages of ten and twenty years; 18 between twenty and thirty years; 10 between thirty and forty years; 13 between forty and fifty years; 7 between fifty and sixty years; 7 between sixty and seventy years; 4 between seventy and eighty years. The oldest was eighty-five and the youngest ten years.

This is somewhat in variance with the table of Glax, who classified 34 cases as follows: Four occurred between the ages of ten and twenty years; 8 between twenty and thirty years; 4 between thirty and forty years; 7 between forty and fifty years; 4 between fifty and sixty years; none between sixty and seventy years; 7 between seventy and seventy-five years.

Leith's statement that it is most frequent in early adult and middle life seems practically supported by the recorded cases, although in half as many cases studied Glax found those of extreme old age, seventy to seventy-five years, frequently attacked. Alcoholic excess appears to have had a causal relation in about one-quarter of the cases, although numerous writers believe it causes the disease in about one-half of

the cases. Certain it is that but a very small fractional part of 1 per cent. of people addicted to alcoholic excess have had this disease. Dietetic error, just preceding the sudden onset of an attack, is recorded in many instances. My case had such a history. Many histories show that great indulgence in eating, as well as in drinking, was followed by what was considered as acute indigestion accompanied by vomiting of undigested food and perhaps bile, that soon proved, usually by necropsy, to be this disease. A few cases have been thought to have resulted from traumatism to the epigastrium. This relation in some cases seems quite remote. Hopkins reports one case in which, four years before an attack of this disease, the victim, a man, was jammed between the bumpers of cars. As a sequel of gastrostomy for gastric troubles it has been noted in a few instances. Silcock reports a case operated on by Mr. Howard Page for esophageal stricture that had been produced by an epithelioma. The attack came on twenty-one days after the operation, which, in six days, proved fatal. Some writers have illogically concluded that ulcer must be the usual cause, inasmuch as the inflammation is most noticeable near the pylorus as is the ulcer. Various poisons and drugs, such as iodide of potash and oxalic acid, have been blamed as etiological factors.

It is by no means clear whether in the idiopathic cases the infection comes from the gastric mucosa or through the blood channels. One would reasonably infer that through the blood other localities would be apt to exhibit similar manifestations. Whether excessive amounts of hydrochloric acid or trypsin may become deleterious to the gastric mucosa is not proved. To consider this disease as a severe type of gastric erysipelas would seem to be the most rational conclusion, and offer the best idea of the mode of invasion. This is a grave form of inflammation, and we know in severe types of erysipelas pus is formed. Whether minute abrasions are present in the mucosa affording ingress of microörganisms, we do not know. In the careful examinations made of the

stomachs removed at necropsies the mucosa has been found, as a rule, practically normal, although petechial and necrotic areas are mentioned. Robson and Moynihan state there is probably always some abrasion. In my case a hurried examination revealed merely a much-reddened mucosa, attributed to three days' almost constant vomiting.

Symptomatology. *The Diffuse Form.* This disease has no special characteristic symptoms, and from its extremely violent and abrupt beginning it is nearly always diagnosticated and treated as acute indigestion or acute gastritis for the first two or three days. A quite common history is that of perfect health, a very hearty meal of some specially liked food followed in a few hours by intense pain in the upper half of the abdomen and vomiting of undigested food, stained with bile; diarrhea or constipation may be noted, the latter ofttimes following the former. Chills, fever, meteorism, great thirst, and hunger; dilirium and coma commonly supervene and death is almost inevitable. Leith found, in his analysis of 85 cases, that pain was present in 75 per cent. of the cases, sometimes preceded by a chill or rigor. It generally appeared with more or less suddenness on the first day and varied from a mere sense of discomfort or weight in the epigastrium to violent pains of a cutting or burning kind. Sometimes it did not appear until the second, third, or fourth day, and usually increased in severity. It was mostly continuous, being rarely paroxysmal and rarely subsiding for any length of time. It was nearly always localized at first to the epigastric region, spreading either slowly or suddenly to the rest of the abdomen with the onset of general peritonitis. As a rule pressure increases the pain.

Vomiting is nearly always present. In Leube's collection there was but one case free from it, and in that one nausea was present. It is usually frequently repeated and continues to the end. The vomited matter, after undigested food, is at first watery and contains alimentary matter and mucus, soon becoming tinged with bile. In two cases pus was vomited.

Jaundice was present in 16 per cent. of the cases collected by Leith.

In most cases fever, varying from 99° to 104° F., is present.

The pulse, full at first, becomes very small, weak, and thready, and later irregular. Hiccough is a common symptom. Restlessness and anxiety beginning early are soon followed by wandering speech and delirium. Usually coma and collapse precede death.

The Circumscribed Form. The symptoms are nearly the same as in the diffuse form of the disease, although the localized pain, increased by pressure, and the increased epigastric resistance, are more marked. The duration of the disease is more prolonged and great emaciation occurs. In some cases a distinct tumor in the epigastrium has been discovered. The vomited matter may contain pus, either in large quantity, as in Callow's case, or in such small amount as to escape notice.

Diagnosis. The sudden onset, the localized pain increased by pressure, and the sense of increased pressure in the epigastrium together with the distressing vomiting of materials as mentioned, the chills, fever, pulse changes, and general aspect of the patient, the increasing severity of the condition, particularly if peritonitis ensues, suggest suppurative phlegmonous gastritis. If, to these, a tumor appears in the vicinity of the stomach the presumption is stronger, and yet stronger if pus be vomited. With all these the diagnosis cannot be positive. It has to be differentiated from perigastritis, from ulcer of the stomach, suppurative cholecystitis with gallstones, hepatic abscess, acute pancreatitis, and poisoning from caustics. It is quite evident this will in most cases be impossible. Examination of the blood has not been sufficiently practised to afford assistance, as in but two cases, according to Boas, has the blood been examined. In Mintz's case he found poikilocytosis, and in Lengemann's the leukocyte count was 30,400. If pus be present the porportion of leukocytes would probably be increased.

PROGNOSIS. This is exceedingly unfavorable in the diffuse variety, as but two cases have been known to recover. In the circumscribed form a few have been reported in which rupture of the abscess into the stomach has occurred and recovery followed. These must be considered as possible errors in diagnosis. In the diffuse form the duration is from one to seven days; in the circumscribed it is probably longer.

TREATMENT. With the exception of four instances none other than symptomatic has been employed for the diffuse variety. The great progress made in surgery of the epigastric region, however, encourages the more frequent employment of exploration by laparotomy. Perhaps by this measure incision and drainage will prove beneficial. Certainly in a positively fatal condition the employment of new forms of treatment are to be encouraged. Whether serum treatment would be of avail has not been answered owing to failure in the diagnosis and employment of the serum. In the circumscribed form, little better has been accomplished.

In the case reported by Leith exploratory laparotomy was done and the peritoneal cavity washed out, as considerable peritonitis was present. The stomach wall was not invaded and the patient died in collapse seven hours later. The necropsy failed to reveal pus in the stomach wall.

In another, reported by Robson and Moynihan, a gastric ulcer had eroded the pancreas and an abscess of that organ had burst into the stomach, causing acute gastritis and severe vomiting with impending death. Posterior gastro-enterostomy was followed by recovery. In another case of non-suppurative phlegmonous gastritis, the same operation was followed by death. No. 80 of Robson and Moynihan's table is von Mikulicz's case of non-suppurative, circumscribed inflammation of the stomach wall; no pus was present. The patient was a male, aged eighteen years, with a clinical picture of perforative gastric ulcer. Localized peritonitis was present. The anterior wall of the stomach was much thickened, rigid, and covered by fibrinous layers. The

inflammatory focus in the stomach wall was uniformly light red and edematous, and not enclosed by adhesions. Its area was of about the size of the palm of the hand, and within this area were two yellowish-gray maculæ of irregular border, but of about the size of a "mark piece" (coin). No perforation was found. Repeated saline irrigation was followed by an iodoform gauze plugging over the involved area which had not been opened, and three sterile gauze tampons introduced into the peritoneal cavity. Recovery followed.

It will thus be seen that down to the report of my case that I am about to make, no case of suppurative phlegmonous gastritis has been operated upon. The four cases cited, however, have a very strong relation to the surgical treatment of the suppurative form of the disease. It would seem, and more particularly from these cases, that opportunity for drainage by abdominal section and external drainage, with or without gastric incision, is necessary. Gastrostomy or gastro-enterostomy would seem to be strongly indicated, particularly as the pyloric end of the stomach is usually most involved. In my case the pylorus was completely obstructed. Gastro-enterostomy would afford drainage of the stomach into the intestine, and incision into the submucous coat with adequate technique would afford exit for pus and relieve tension. Robson and Moynihan recommend in mild terms gastrostomy or gastro-enterostomy in acute, diffuse, phlegmonous gastritis, and in the circumscribed form state "opening and drainage of the abscess would be advisable."

The history of my case was as follows:

A case of circumscribed suppurative phlegmonous gastritis; gastrostomy; complicated by pregnancy at six months, and abortion; recovery. Mrs. T., white, aged thirty-six years, who had had seven children, followed in 1895 by a miscarriage, was brought in an ambulance to Columbia Hospital for Women late on the night of October 6, 1907, by her physician, Dr. John S. Dorsey. She had suffered from pain in the epigastric region for several years, which was usually

relieved by taking food. Her last menstrual period occurred April 13, 1907, and she considered herself pregnant. The history of this illness, as given by Dr. Dorsey, is about as follows: October 3 she ate heartily of boiled cabbage for dinner and crabs late at night. In the night she was attacked by severe pain in the region of the stomach. Dr. Dorsey was called and gave morphine for pain. The following day the pain continued and vomiting set in. An attempt to move the bowels by enemata and cathartics was unavailing. The temperature was elevated, ranging from 99.5° to 101.5° F.; the pulse rapid and weak. The next day croton oil was employed by mouth, but the bowels failed to respond. The various remedies at the command of Dr. Dorsey were not effective in relieving the pain, constipation, and vomiting. The vomited material was first solid and partially digested food. Later it was watery and frothy, changing to dark green. She was so enfeebled and appeared to be so very ill that he secured an ambulance and took her to the hospital Sunday night, as already mentioned. No chill or sweat was experienced. I saw her about eleven o'clock that night, she having reached the hospital a few minutes earlier. At that time her pulse was thready and her countenance anxious in appearance. On examination, on the anesthesia carriage, I discovered the uterus extended to one inch above the umbilicus and the epigastrium was distended, exquisitely tender, and tympanitic. She was promptly anesthetized, and, in the presence of Dr. Wallace Neff, a member of this association, and Dr. Dorsey, a median line incision above the uterus was made. The intestinal loops were congested, but non-adherent. The stomach was palpated. It was found to be fully three-quarters of an inch thick at the middle of the greater curvature, gradually thinning toward the cardiac end. In the pyloric end and in front was a mass nearly the size of a man's fist, that was soft though not doughy to touch. This gradually thinned out toward the middle of the stomach. The stomach was opened at about its middle by a longitudinal incision of

about three inches, and the mucosa inspected. The lumen of the pylorus would not permit the entrance or engagement of the tip of my little finger. To more definitely determine the nature of the enlargement a separate short incision was made over it, when the nature of its contents was manifest. Gauze was packed around it and it was opened, and two or three ounces of grayish pus escaped. The long incision was closed and the pus cavity wiped out. A rubber tube was tightly sutured into it and brought out of the abdomen. A light gauze drain was packed about it. She was fed by the rectal route for twenty-one days. Five days after operation liquids were given by mouth, as salt solution by hypodermoclysis and liquids by rectum did not quench her ravenous thirst. The following day the contents of the stomach came through the wound. A few days later solid food was given and the tube removed. Stomach contents ceased escaping in a few days. On the eighth day, with little effort, she aborted, the fetus living three hours. With the exception of infection of the abdominal incision, which required resuturing, she has made an uninterrupted recovery.

Bibliography.

1. Auvray. Etude sur la gastrite phlegmoneuse, Thése de Paris, 1866, 4°.

2. L. Bernstein. Brit. Med. Jour., 1906, I, 441.

3. J. M. Bernstein. Trans. Path. Soc., London, 1906, lvii, 324–328.

4. J. Bernstein. West London Med. Jour., London, 1907, xii, 129.

5. I. Boas. Diseases of the Stomach. The sole authorized English-American edition from the latest German edition, by A. Bernheim, Philadelphia, 1907, F. A. Davis Co.

6. Candmont. Bull. Soc. Anat. de Paris, 1848, xxiii, 273.

7. J. M. Cotterill. Scot. Med. and Surg. Jour., Edinburgh, 1905, xvi, 236–238.

8. Duchek and L. Rakovac Wien. med. Presse, 1874, xv, 574–577.

9. C. H. Fagge. Trans. Path. Soc., London, 1874–75, xxvi, 81–83.

10. Fontan. Bull. et mém. Soc., méd. d. hôp. de Paris, 1866, ii, 131.

11. Gandy. Arch. Méd. Belge, Brux., 1863, xxxi, 459–464.

12. Gläser. Berl. klin. Woch., 1883, xx, 790.

13. Glax. Ibid., 1879, 565.

14. E. Guibout. France Méd., Paris, 1882, ii, 897.

15. J. Guyot. Union Méd., Paris, 1865, 22nd s., xxvii, 184–186.
16. S. O. Habershon. Guy's Hosp. Rep., London, 1855, 3d s., i, 113–115.
17. Hopkins and Weir. Brit. Med Jour., 1904, II, 1406.
18. Huguenin. Rev. Méd. de la Suisse, Rome, 1903, xxiii, 727.
19. E. R. Hun. New York Med. Jour., 1868, vii, 18–23.
20. Kelynack. Lancet, London, 1896, i, 702.
21. Leith. Allbutt's System of Medicine, 1907, second edition, iii.
22. Leith. Edinburgh Hosp. Rep., 1896, iv.
23. Lejars. Bull. et mém. Soc. de chir. de Paris, 1906, n. s., xxxii, 1122.
24. Leube. Ziemssen's Cyclop. of Prac. of Med., 1877, vii, 154.
25. J. J. Mackenzie. Canada Lancet, Toronto, 1906–07, xl, 491–494.
26. MacLeod. Lancet, London, 1887, ii, 1166.
27. Manoury. Bull. Soc. anat. de Paris, 1842, xvii, 175.
28. Mascarel. Ibid., 1830, xv, 176.
29. Mayor. Bull. Soc. anat. de Paris, 1843, xviii, 298–301.
30. Maget. Ibid., 1840, xv, 173–177.
31. Montognon. Loire méd., St. Etienne, 1903, xxii, 209–213.
32. Morel. Bull. Soc. anat. de Paris, 1865, xl, 625–628.
33. B. G. A. Moynihan. Surg., Gyn. and Obstet., Chicago, 1907, iv, 677.
34. B. G. A. Moynihan. Med. Chronicle, Manchester, 1903–04, 4 s., vi, 77–107.
35. Wm. Osler. The Principles and Practice of Medicine, fifth edition, 1903.
36. M. Perrin and P. Blum. Rev. méd. de l'est, Nancy, 1905, xxxvii, 697.
37. Pilliet. Bull. Soc. anat. de Paris, 1893, lxviii.
38. Raynand. Bull. Soc. anat. de Paris, 1861.
39. A. W. Robson, Mayo, and Moynihan. Diseases of the Stomach and Their Surgical Treatment, second edition, 1904.
40. Karl Schnarrevyler. Ueber Gastritis Phlegmonosa (Basel), Berlin, 1906, S. Karger, 26 pp., 1 pl., 8°.
41. A. Q. Silcock. Trans. Path. Soc., London, 1882–83, xxxiv, 90–93.
42. F. Grainger Stewart. Edinburgh Med Jour., 1868, n. s., xiii, 732–735.
43. A. Testi. Ann. univ. di med. e chir., Milano, 1883, clxv, 523.
44. A. Testi. Ball. d clin., Napoli, 1884, i, 91.
45. C. J. Wagner. Canada Pract. and Rev., Toronto, 1907, xxxii, 12–16.
46. T. Whiphann. Brit. Med. Jour., 1884, i, 896–898.

DISCUSSION.

Dr. I. S. Stone, of Washington, D. C.—I should like very much to hear this paper discussed. We know a great deal about appendicitis and about a great many matters of every-day surgery; but when Dr. Bovée reports such a case as this, one remarkable for its rarity, and also for the successful treatment which it received, it seems to me the subject ought not to be passed by lightly without calling attention to some of these facts. While there are many here who can discuss this paper better than myself, I want to make one comment and it is this: The only fear I would have would be that I might operate expecting to find acute pancreatitis. I do not mean to say that I would not exhaust all methods of diagnosis before arriving at a correct conclusion, but it strikes me, as Dr. Bovée read the paper, and having known of this case in the hospital, that such a mistake would be possible, Having seen cases of acute pancreatitis, in my humble judgment, we may find it important to discriminate between the two conditions.

Dr. Bovée (closing).—I have nothing of interest to add, only to express my opinion with regard to what Dr. Stone has said, namely, that probably the most frequent condition, or the one most likely to be confounded with this condition, would be acute pancreatitis.

I had hoped that some other cases would be reported in the discussion, because if they were not they ought to be. When we have a condition in abdominal surgery that is so rare, that there are only about seventy-five cases on record in the history of medicine, it is time for us to be looking around to see if there are not some that are not reported. I remember distinctly, when I first worked up the subject of nephro-ureterectomy, there were only eight cases on record, but the number began to increase gradually. Different surgeons began to mention the cases they had had, so that the number largely increased and it has resulted in a better knowledge of the indications and methods of procedure in doing the operation. So I hope that if we do not hear at this meeting of more cases, or of greater experience in this line of work, it will be the means of bringing these cases forward at our subsequent meetings.

REPORT OF A CASE OF INOPERABLE SARCOMA OF THE NECK TREATED SUCCESSFULLY WITH COLEY'S TOXINS.

By John Chadwick Oliver, M.D.,
Cincinnati.

Richard K., aged fifty-two years, entered the surgical service of the Cincinnati Hospital on August 30, 1905. His personal and family history had no bearing upon the condition for which he sought relief.

Fourteen years previously a small, hard, freely movable "kernel" formed on the right side of his neck. He could not remember the exact point of its location. This small lump either remained stationary or enlarged but very, very slowly for eleven years, but at the expiration of that period of time it became quite active, so much as to cause him to seek relief through operation. Dr. Joseph Ransohoff removed three tumors from his neck about this time. The pathologist, Dr. Carl Hiller, reported the tumor to be a myxofibrochondrosarcoma.

This operation was followed by but temporary relief. New tumors appeared, and grew more rapidly than did the original.

When he entered the Cincinnati Hospital the neck on both sides contained numerous, painless masses of large size. There was one semifluctuant mass the size of a large orange over the right angle of the jaw encroaching upon the parotid region; another large, hard, firmly fixed mass under the right sternomastoid muscle, intimately adherent to the sheath of the great vessels; a mass the size of a walnut between the

masses mentioned above; a large, easily movable, hard mass extended to the left of the point of the jaw; a large, hard, partly fixed mass was over the left carotid sheath; and a smaller, movable mass was below this. The skin was congested over these masses. The enlargements were so great as to project beyond the jaw on either side. The right tonsil and side of the pharynx were pressed inward by these masses to such an extent as to seriously encroach upon the lumen of the throat. The right tonsil was indurated, ulcerated, and had the appearance of a malignant growth. The patient said that he had difficulty in swallowing. The liver was enlarged downward to the level of the umbilicus. His general condition was good, but he had rather an anemic appearance (cachexia?).

Dr. C. E. Caldwell, who was in charge of the service at the time he entered, attempted to remove the upper tumor on the right side for diagnostic purposes, but was compelled to desist because he was unable to enucleate the entire mass. The interior of the tumor was found to be very friable, very vascular, and intimately united to the lower jaw. Some of the mass was removed for microscopic examination, however. The pathologist reported the specimen to be one of chronic adenitis, but the later history of the case proves that he did not cut sections from the right part of the growth.

The use of Coley's serum was begun on October 5, 1905. One-half minum, diluted with sterile water, was injected under the skin of the back between the scapulæ. This was followed by a marked local reddening of the skin over the masses, and also by a general reaction as manifested by a chill and fever.

The serum was given in gradually increasing doses until March 17, 1906. The injections were given, as a rule, every other day, but this rule was not rigidly followed because of unavoidable obstacles to the following out of the plan. During part of this period the parts were also exposed to the action of the Röntgen rays. These exposures must be looked

upon, to a certain extent, as robbing us of the right to attribute all of the good result to the use of the serum.

The patient left the hospital March 19, 1906, with scarcely a remnant of the original growths. When seen one month later the masses had apparently disappeared entirely, and he was feeling perfectly well.

Because of apprehension, on the part of the patient, the use of the *x*-ray was continued at intervals of about a week.

The chart shows most graphically the results of the injections. The second bottle of serum used seemed to produce no reaction, so another was sent for and this proved to be active.

About two months after the patient left the hospital he developed, apparently spontaneously, a severe attack of facial erysipelas. He returned to the hospital and received treatment for the condition. He recovered promptly.

The patient was kept under observation from the time he left the hospital until the present time. The tumors disappeared entirely and remained away until (when the patient reported at my office on November 15, 1907) I discovered a recurrence in the right parotid region. He returned to the hospital and is again under treatment with the toxins.

When the title of this article was sent to the secretary I believed that the patient was entirely well, but later events have proved that I was premature in announcing this as a cure from the use of the toxins.

I have made use of the mixed toxins in the treatment of about fifteen cases of inoperable sarcoma, but the case herewith reported is the only one in which good results seemed to follow the use of the remedy. I am, therefore, somewhat loath to ascribe the good results entirely to the use of the toxins. It may be that the combination of the *x*-ray with the toxins was a factor of no small importance in bringing about the result. The recurrence might be taken to lend color to this belief.

During the past three months I have had the opportunity of using the mixed toxins in two patients from whom I had

previously removed sarcomata. (One following the removal for the third time of a sarcoma of the thigh, and the other following a second operation for the removal of a sarcoma of the breast.) In each patient marked reactions follow each infection, but it is entirely too early to state the probable result of the treatment.

I have used this remedy in three cases of tuberculous cervical adenitis. The reactions were not apparently as well marked as they are in cases of sarcomata. No good results were obtained in this class of cases.

Dr. W. B. Coley (*Medical Record*, July 27, 1907) says that he has treated about 400 cases of inoperable sarcomata, and that 42 of these have recovered. It is highly probable that one is justified in assuming that about 10 per cent. of these cases are saved by means of this method of treatment in the hands of Dr. Coley. This is a very small percentage upon which to base conclusions as to its being regarded as a remedy of much value in the treatment of the sarcomata; but, on the other hand, I doubt whether the average results from operation in operable cases will show a much greater percentage of cure. My individual experience does not lead me to believe that we can look for more than 10 per cent. of cures as the result of operative treatment in the usual run of cases. One can certainly safely assert that *less* than 10 per cent. of inoperable cases recover if not treated with the toxins.

I gather from my reading of medical literature that the average results obtained from the use of the mixed toxins, in the treatment of inoperable sarcomata, are not nearly so good as are those obtained by Dr. Coley. The only rational explanation of this fact is that Dr. Coley has more faith in the remedy, and, therefore, gives it a fairer, more thorough trial, because there cannot be the slightest doubt as to his accuracy of observation or honesty of purpose.

REPORT OF A CASE OF CHRONIC PARENCHYMATOUS NEPHRITIS IN WHICH DECAPSULATION OF BOTH KIDNEYS WAS PRACTISED.

By John Chadwick Oliver, M.D.,
Cincinnati.

The report of this case may add something of value to the literature upon the subject of decapsulation of the kidney, and at the same time to the material from a consideration of which one must make up his mind as to the value of this method of treatment.

The patient, R. K., was admitted to the medical ward of Christ Hospital on April 24, 1905. He was twenty-five years of age, a barkeeper by occupation. The family history was unimportant.

The patient had typhoid fever when sixteen years of age, but was in good health afterward until shortly before he applied for admission to the hospital. He then noticed some swelling of his feet and ankles. He used alcohol regularly, but not to excess.

When admitted to the hospital he was well nourished, but his skin appeared pale and pasty. His heart and lungs were normal. Edema of the superficial tissues of the abdomen was present, but there was no ascites. The legs were edematous about the feet and ankles.

The history of the case can very naturally be divided into the period before operation, the operation, and the post-operative period.

The first period, which extended from April 24, 1905, to December 9, 1905, was marked for the most part by a steady increase in the intensity of the symptoms, and by a gradual decline in the vitality of the patient. His treatment during this period included free purgation, hot packs, fluid diet, diuretics, and such other measures as are ordinarily employed in this class of diseases.

At the time of his admission to the hospital the examination of the urine was as follows: Amber, cloudy, specific gravity 1015, acid, no sugar, albumin 3 per cent. The microscope revealed great numbers of granular casts, some epithelial casts, a small amount of blood, pus, and masses of desquamated epithelium. During the first twenty-four hours of his residence in the hospital he passed but eight ounces of urine, but many fluid stools were passed during this period.

During the first three months in the hospital the medication included all of the diuretics and his diet was most carefully selected, but there was no improvement. Hot packs were sometimes efficient, but in spite of all treatment the edema increased very markedly, especially about the neck, arms, and abdomen. The appetite became very poor, pain in the head became a very marked feature, and nausea was persistent.

Eighteen pints of clear, straw-colored fluid were withdrawn from the peritoneal cavity on September 14. The abdomen was tapped four times between this time and December 9; the amounts withdrawn varied from fifteen to nineteen pints at each tapping.

The amount of urine secreted varied from four to fifteen ounces in twenty-four hours. Restlessness became excessive, the patient was dull all the time, but complained of constant pain in the head and of nausea.

On November 8 the patient had a slight convulsion. The heart action was very bad, at times very weak and again irregular. A soft, apical, systolic murmur was now detected for the first time.

The patient was steadily losing ground and was insisting upon a trial of decapsulation of the kidneys—an operation he had been told would be of value to him. His parents were also desirous of a resort to this measure.

The day before operation there was 12 per cent. of albumin in the urine, ½ per cent. of urea, the amount of urine was very small, and the general edema was very great. It was almost impossible to prevent the patient from lapsing into coma. His eyesight was nearly gone.

Operation. The patient was taken to the operating-room on December 9 in very poor condition. The pulse was very weak and rapid, the respirations were short and labored, and restlessness was extreme. Stimulants were given freely before the anesthetic was administered. The pulse and respiration improved during the period of anesthesia.

Oblique incisions were made in each loin. The cut tissues were so edematous as to cause a stream of serum to pour out from the incisions. The intestines floated up into the area of operation and had to be kept out of the way during the entire operation. Each kidney was about one-third larger than the normal kidney, but the capsules were readily stripped from the subjacent tissues. The capsules were freely stripped off down to the pelvis. The kidneys were then stitched to the deep fascia by bands of capsule left for this purpose. The incisions were closed completely except for the presence of a few strands of silkworm gut introduced on either side.

When the patient was replaced in bed his pulse was 108, and his respirations were 32. Very little shock followed the operation.

His eyesight showed improvement the day following the operation. He passed nineteen ounces of urine in the first twenty-four hours, the albumin being 9 per cent.

His recovery from the operation was uneventful. By the sixth day after the operation his eyesight was improved although there were marked changes in the retina of each eye. Albuminuric retinitis with hemorrhages was present

in each eye, the left being the more involved. (Report of Dr. C. W. Tangeman.)

The urine increased to fifty ounces a day in a week after the operation; the urea increased to 1½ per cent., but the percentage of albumin remained high. The edema diminished rapidly, so that at the end of two weeks after the operation one could truthfully say that marked improvement had taken place.

This period of improvement was followed by one of relapse. The edema increased rapidly and repeated tappings were required, the heart exhibited symptoms of gradual dilatation, and the patient had almost nightly attacks of severe dyspnea.

The chest cavity was aspirated upon January 7 for the first time, twenty-seven ounces of serum being withdrawn. Severe cough with urgent dyspnea followed immediately upon the aspiration, and the patient's lungs became very edematous. The patient expectorated a quantity of clear, salty tasting fluid. The urgent symptoms lasted throughout the night.

From this time on the attacks of dyspnea increased in frequency and severity, and were always worse at night. Severe dyspnea would supervene upon any slight exertion, the pupils would dilate widely, the body became bathed in cold sweat, and there was always a complete relaxation of the sphincters resulting in involuntary defecation and urination.

During the month of March the chest was aspirated five times, the amount of fluid withdrawn each time varying from thirty to forty-six ounces.

About April 1, without any apparent reason, a marked improvement occurred. The night attacks became less severe and hypodermic medication (morphine) was no longer necessary. The patient was put upon strontium bromide, grs. xv, three times daily, and all other medication was gradually withdrawn. The urine increased in quantity, the edema almost entirely disappeared, and the patient was soon able to be up and about. The albumin in the urine was reduced to about 4 per cent., the urea was less than 1 per cent.,

and the casts were very much fewer and less granular. The appetite was good and the digestion seemed to be perfect.

The patient was dismissed from the hospital June 8. He felt perfectly well in spite of the fact that his weight had been reduced one-third.

An examination of his urine made the day before his dismissal was as follows: Albumin barely 1 per cent.; urea, 1.5 per cent.; casts, comparatively few; no blood.

Between June and October he continued to gain in strength and was able to do a little light work. His eyesight remained poor, and for that reason he was unable to do any close work.

The patient was taken suddenly ill during the first week in October. He became comatose and remained in that condition for about three days, at the end of which time he died. The edema did not return.

A postmortem examination was made at the home of the deceased. A complete examination was not permitted. The kidneys were but slightly contracted. Interstitial changes were not well marked, except that the cortex was very thin. The new capsules formed by the surrounding tissues were very dense and were so firmly adherent as to render their removal very difficult. The remnants of the old capsules could be readily differentiated from the new ones. No report of the microscopic examination of the kidneys has been secured.

Detailed report of urinary findings:

On admission: Amber, cloudy, specific gravity 1015; acid; no sugar; albumin 3 per cent.; great number of granular and some epithelial casts; some blood cells and masses of desquamated epithelium.

April. Albumin, maximum, 5 per cent.; urea, 5 per cent.

May. Albumin, maximum, 8 per cent.; minimum, 5 per cent; urea, maximum, 1.5 per cent.; minimum, 5 per cent.

June. Albumin, maximum, 9 per cent.; minimum, 5.5 per cent.; urea, maximum, 1.5 per cent.; minimum, 0.2 per cent.

July. Albumin, maximum, 12 per cent.; minimum, 4.5 per cent.; urea, maximum, 2.5 per cent.; minimum, 1 per cent.

August. Albumin, maximum, 12 per cent.; minimum, 5.5 per cent.; urea, maximum, 1.8 per cent.; minimum, 1 per cent.

September. Albumin, maximum, 12 per cent.; minimum, 6 per cent.; urea same as August.

October. Albumin, maximum, 14 per cent.; minimum, 6 per cent.; urea examinations not made.

November. Albumin fell once to 2.5 per cent., otherwise condition the same.

December. Morning after operation. Albumin, 9 per cent.; maximum for month, albumin, 12 per cent.; minimum, 3.6 per cent.; urea, maximum, 1.6 per cent.; minumum, 1.1 cent.

January. Albumin, maximum 9.9 per cent.; minimum 5.4 per cent.; urea, maximum, 1.5 per cent.; minimum, 1.1 per cent.

February. Albumin, maximum, 6.9 per cent.; minimum, 4.5 per cent.; urea, maximum, 1.6 per cent.; minimum, 1.3 per cent.

March. Albumin, maximum, 8 per cent.; minimum, 2.4 per cent.; urea, maximum, 1.3 per cent.; minimum, 0.7 per cent.

April. Albumin, maximum, 4 per cent.; minimum, 1.5 per cent.; urea, maximum, 0.9 per cent.; minimum, 0.8 per cent.

May. Albumin, maximum, 2.6 per cent.; minimum, 2.5 per cent.; urea, maximum, 0.9 per cent.

June. Day before leaving hospital. Albumin barely 1 per cent; urea, 1.5 per cent.; casts comparatively few; blood absent.

During the months of February and March the general dropsy increased very much.

There was a rapid improvement in his general condition and marked subsidence of dropsy during the months of April and May.

I am very much indebted to Dr. Frances M. Hollingshead for her careful records of this case, and for the persistence with which she followed the history of the patient.

DISCUSSION.

Dr. Samuel J. Mixter, of Boston.—I wish to speak, first, on the case of sarcoma. I think Dr. Oliver is to be congratulated on having obtained such an excellent result from the use of the Coley serum. Most of us have tried it a good many times and have been disappointed, and, as I said the other day at a meeting, after Coley read a paper in Boston, I think the reason we have been disappointed is because we do not know how to use it; not that every case can be cured or relieved by that method of treatment, but we have today, as the essayist has said, in this disease an absolutely hopeless condition, and anything which promises a good result, as shown by Coley's figures, should be tried thoroughly. I have been able to follow a case with Dr. Coley, and where there was recurrence of abdominal sarcoma after nearly three years, where prophylactic injections were used for a certain length of time, and the patient improved after recurrence. It was absolutely inoperable at first, and the patient improved very much under the use of the toxins; the mass became very much more movable, so that I was then able to take away a considerable part of it, and since then the injections have been continued. As to the idea of removing a part of the tumor, as Dr. Coley suggested, because you cannot give a patient enough of the serum if the mass is very large, to influence it, that depends somewhat upon the size of the mass. The action of the serum is certainly very uncomfortable for the patient, and a good many patients will refuse to continue it. I think, then, in all cases of inoperable sarcoma, whether cervical or not, we ought to use the serum very thoroughly, and, still more, we ought to use in every case of postoperative treatment a course of the serum treatment. If the sarcoma can be reduced when it is enlarged, it certainly seems reasonable to suppose that the few cells that may be left after an operation can be affected to a much greater extent, and that,

therefore, it is the absolute duty of every surgeon to give a thorough course of postoperative treatment, and we should not stop as soon as we have generally done so. In other words, we should keep it up for a considerable period, perhaps with intervals of rest, but to keep it up very much longer than was formerly the practice.

Dr. James A. Goggans, of Alexander City, Ala.—I wish to say a few words with regard to the case of nephritis which the essayist reported. It seems to me there is more sense in decapsulating the kidneys in cases of parenchymatous nephritis than in decapsulating them for the more chronic form known as the interstitial variety of nephritis. The more acute the case is the more certain we are to get good results. I will say, however, that I am very doubtful as to whether renal decapsulation did the patient any good, as reported by the essayist.

Dr. Joseph Ransohoff, of Cincinnati.—I wish to say a word or two in connection with this case of sarcoma of the neck, inasmuch as my name has been mentioned in connection with it. The operation was done so long ago that I had no recollection of the case until Dr. Oliver referred to the operation I had done. It was a case evidently in which a mixed tumor had been present for a great many years, and then took on sudden activity. A tumor that takes on sudden activity may also take the reverse action occasionally, and cease to grow. We see, every now and then, tumors of the brain which have been diagnosticated as such, beyond peradventure of a doubt, which cease to grow, and the symptoms may entirely disappear. I have a case now under observation of sarcoma of the brain; at least a diagnosis was made of tumor of the brain, and, subsequently, a sarcoma of the eye-ball was removed, in which case localizing symptoms were not discoverable. The man had such intense headache that I concluded, thirteen years ago, to do a decompression operation. I did so, making the operation upon the left side in the temporal region. The man was relieved of his pain for three years. In the interim of these three years sarcoma developed in the left eye, and that eye was removed. After three years this patient again commenced to have intense headaches, and my assistant, during my absence, made a second operation, and enlarged the original wound I had made in the skull. The patient was again relieved of his pain,

and has continued to remain well. I saw him a short time ago, and all symptoms of brain tumor have entirely disappeared.

I have had four or five cases in which the Coley serum has been used, and in only one have I seen as good a result, or, perhaps, not as good a result as in the case reported by Dr. Oliver. It was one of those cases of malignant recurrent fibrosarcoma, or plastic tumor, that Sir James Paget so characteristically described as occurring particularly about the shoulder blades—a fascial sarcoma. I operated twice on that case. The tumor grew rapidly, and we used the Coley serum; it nearly disappeared, but at the end of six months it began to grow again, slowly, then assumed such rapid proportions that nothing could be done. In connection with these tumors we must take cognizance of the fact that a given growth varies in the malignancy of its manifestations from time to time. Even growths in different individuals of the same histological character vary in their malignancy.

I would like to mention a case of sarcoma of the axilla I operated on in a man from Germantown, Ohio, when he was sixty-nine years of age. He lived for fifteen years thereafter, and developed melanosarcoma of the arm on the same side. Anyone can see the specimen in the museum at the City Hospital, Cincinnati. This sarcoma was removed a year and one-half ago, and the man continues well. If I had known the subject was coming up I would have presented this specimen of melanosarcoma. We must, I think, take cognizance of the variation in malignancy of growths in different individuals of like histological character, and even in the same growths I am sure that there are variations in malignancy at different times in the individual. And why should there not be? If we see infectious diseases varying in their malignancy, from time to time, or in their stages of activity, Why should not the same principle or variation apply likewise to neoplasms?

Dr. Oliver (closing).—There seems to be an unanimity of opinion in regard to the lack of value of Coley's toxins in sarcoma, as a rule. I simply reported this case because of the fact that it is unique in my experience; not because I was a great believer in the use of Coley's toxins. I think some of the cases in which I have used Coley's toxins have progressed more rapidly afterward than they did before the toxins were administered. I recall one case in particular of sarcoma of the skull, which occurred in the son of a colleague of ours,

where death occurred immediately after the injection of the initial small dose of Coley's serum. Death resulted in less than a minute. That, of course, may have been a coincidence.

I purposely refrained in my paper from expressing any opinion in regard to what effect the removal of the capsules of the kidneys of this man had upon the subsequent course of the disease. My personal opinion is that the disease was not influenced in the least by the operation; that he would probably have passed through a course similar or almost the same if the kidneys had retained their original capsules. However, this case was followed from start to finish, and therefore a a report of it is of value in this connection.

SARCOMA OF THE BRAIN.

Dr. Joseph Ransohoff, of Cincinnati, Ohio, presented an interesting specimen removed from a young man, aged nineteen years. The patient had a large sarcoma of the upper end of the humerus. He was told that an amputation would be the only thing that could save him. There were no evidences whatever of metastases. The patient was not operated upon. Three days after he was advised to have the operation, he, without any premonition, complained intensely of headache, which morphine even did not relieve. Coma supervened and he died within thirty hours of the onset of the cerebral symptoms. It was believed that a cerebral metastases with a hemorrhage had ruptured. The autopsy revealed many metastases in the kidney, the liver, and the perirenal fat. In the left hemisphere of the cerebellum there was a soft sarcoma as large as an olive. A hemorrhage into it, which possibly resulted from the increase of arterial tension following the advice given him as to the amputation, had caused a tear of the pia. The hemorrhage can clearly be seen in the fourth ventricle, extending thence through the iter into the third ventricle. There had been no evidence, whatever, of brain tumor until the terminal symptoms manifested themselves.

VENOUS THROMBOSIS AND HYDROCELE OF THE INGUINAL CANAL.

By Joseph Ransohoff, M.D.,
Cincinnati.

Considering varicosities of the pampiniform plexus, the rarity of thrombosis in them is striking. In those of the lower extremity and of the rectum, clotting and inflammation are of frequent occurrence. In the rare instances in which I have seen a varicocele thus affected, the process has, for the most part, been limited to the distal radicals and always in close relationship to the testicles and the tunica vaginalis. In contradistinction to these cases I beg to call attention to thrombosis of the spermatic vein occurring higher up and in the inguinal canal, and leaving intact the lower vein radicals. The long course of the spermatic vein and the comparatively slight amount of blood, which in an auxiliary way flows from the testicle through the deferential vein, would seem to make it a favorable place for stagnation in the blood column and thrombosis. It would seem that by violent effort, by direct injuries, or by pressure of a truss, thrombosis with its usual sequences would be of common observation. Either this is not the case or the condition, if observed, may have seemed so trivial as not to have been deemed worthy of record. At least in my study of relevant literature I have found nothing bearing on the subject. Nevertheless, in the last few years I have seen three distinct cases of thrombosis in the spermatic cord within the canal, each affecting an adult without varicocele. I beg to submit a brief history of the cases.

Case I.—J. W. F., aged forty-three years, married, and of excellent habits. Has no history of venereal disease or of hernia. After violent exercise at tennis he suddenly experienced very sharp pain in the groin, attended with nausea and slight vomiting. When seen twenty-four hours after the onset there was some acceleration of the pulse rate, and the temperature had risen to 102°. After the third day the temperature had entirely subsided and continued normal. The first examination showed a very marked tenderness in the upper part of the scrotum, and the presence of a firm cylindrical swelling, evidently of the cord, extended into the inguinal canal, but failing by more than one inch to reach the epididymis. At the lower end a bifurcation of the induration could easily be felt. As far as it could be palpated the cord presented the feel of a thrombosed vein. Forty-eight hours after the onset there developed a tenderness and a slight swelling of the epididymis, although the enlargement of the cord did not extend downward. There was no enlargement of the external ring, nor could any impulse on coughing be elicited. Under purely expectant treatment and rest in bed the condition gradually subsided, and in about ten days the restitution to the norm was complete.

Case II.—S. G., aged fifty-two years, married. Has had several attacks of gonorrhea, the last one twenty-eight years ago. Has never had a hernia. He ascribes his condition to excessive golfing, but is not aware of having injured himself by any single violent effort. He presented himself at the office because of a dull pain in the groin, which had continued without abatement for one week. The pain was not severe enough to keep him from his work. There were no constitutional symptoms at any time. Through the thin abdominal wall the intracanalous portion of the cord could be readily palpated. It was very tender to the touch, distinctly indurated, and nearly as large as the little finger. Traced downward the induration could be felt in the upper part of the scrotum, and was gradually lost in the lower part of the cord. Neither the

testicle nor the epididymis was involved at any time. As in the previous case the condition disappeared slowly in a little over three weeks.

Case III.—S. R., aged forty-nine years, widower. Has no history of venereal disease. He has had a reducible right inguinal hernia for many years, for which he has recently had a new truss fitted. To this he ascribes his present illness, which began with pain in the region of the hernia sufficiently severe to confine him to his bed. When first seen he had slight elevation of temperature, and some malaise consequent thereon. There was some little nausea, but no vomiting. The bowels moved readily on slight stimulation. An examination showed the abdominal wall over the canal very much relaxed as one sees it after the long wearing of a truss. The hernial opening was large enough to readily admit the finger. It was empty, but very tender. On my second examination, twenty-four hours later, there could be felt within it a tender cord running into the scrotum and not quite reaching the epididymis. During the next few days the latter became somewhat tender and sore. There was at no time any effusion into the tunica vaginalis. Three weeks in bed with rest sufficed to cause the induration in the cord to gradually disappear. Although more than a year has passed since the attack, and the patient has continued wearing the truss, there has been no recurrence.

In each of these cases I have recently examined the spermatic cord and found it normal. While we are led to believe, and in the majority of cases it doubtless is true, that thrombosis of a vein recovers with the formation of a fibrous cord which remains in these cases, it is probable that by a process of liquefaction and absorption of the thrombus an entire restitution, even to the caliber of the veins, took place. In none of these cases was there any justification for operation, wherefore the clinical diagnosis of thrombosis of the spermatic vein might be questioned. In each of them an infective process could be positively excluded, and except in the third

FIG. 1.—Simple hydrocele of cord.

Fig. 2.—Hydrocele of cord with large thrombus above sac.

Fig. 3.—Bilocular hydrocele with thrombus. Larger cyst intra-abdominal.

Fig. 4.—Multilocular hydrocele of the cord.

case a hernia did not exist. The slight participation of the testicle and the epididymis in the process, and its secondary nature, preclude even the suspicion of an ordinary epididymitis. All of the cases were on the right side.

With the exclusion of the most common etiological cause of thrombosis, namely, bacterial invasion, we must look to some mechanical obstruction or trauma, from very violent muscular action, as to the cause of the thrombosis in these cases. Whereas, it is well known that even prolonged compression of a vessel, as of the carotid artery, in prevention of hemorrhage in major operations about the head, is not followed by thrombosis; this condition is much more likely to arise in thin-walled veins with their many small and irregular tributaries. It appears to me that the cases described are a mild type of the condition following torsion of the cord, to which attention has quite recently been directed. In torsion of the cord, however, the symptoms are exceedingly severe and associated with symptoms of abdominal shock. In 70 per cent. of the cases collected by Bochdaneck, castration became imperative by reason of gangrene of the testicle. In the great majority of cases the diagnosis of torsion of the cord was not made, and the operations were for the most part performed under the belief that there existed a strangulated hernia.

Fortunately I have had two opportunities of verifying the diagnosis of thrombosis of the spermatic vein by operation.

Case IV.—J. C., aged thirty-eight years, admitted to the Cincinnati Hospital, January 21, 1899. Has had a previous history of malaria. On January 9, while working on a flat car unloading timber, a jack-block struck him in the groin. He was knocked off the car, but did not lose consciousness at any time. With assistance he was enabled to walk to his home. Twenty-four hours after the injury was sustained, he noticed a swelling in the left groin and severe paroxysmal pains. The bowels moved regularly, and there was no nausea nor vomiting at any time. He remained in bed for about

two weeks, during which he states the swelling diminished and the pain in the groin abated sowewhat.

Examination negative except for local condition. Over the abdomen there is a bluish-green discoloration of the skin near the anterior superior spinous process. This is evidently the result of a superficial ecchymosis. The left testicle hangs much lower than the right. In the cord for about two inches distinct, irregular thickenings of the vein can be felt. The ring, distinctly patulous, admits the finger which comes in contact with a hard, circumscribed swelling one inch or more long. It is of a diameter of the little finger, and appears to have a distinct impulse on coughing. The cord feels like a thrombosed vein.

Operation, January 23, 1899. General anesthesia. Incision over the external abdominal ring extending into the scrotum. Easy exposure of the thrombosed vein. The further steps of the operation consisted of splitting the aponeurosis of the external abdominal oblique and thorough exposure of the contents of the inguinal canal. In this there was found an unoccupied, narrow, vaginal prolongation of the peritoneum, and underneath it the cord with the vas deferens hidden from view by the thrombosed vein which extended quite into the internal ring. The thrombosed part of the vein, irregular in diameter and about two inches long, was resected. The operation was completed as an ordinary Bassini. The patient made an uninterrupted recovery and was discharged February 16, 1899.

This case is interesting in that it was the nearest approach I have seen to a hernia resulting from a direct injury. The presence of a partly open peritoneal process directs attention to the possibility of an effusion into it as a result of the thrombosis, if the latter had not been relieved by operation. When this process does not exist, a hydrocele within the canal cannot probably develop. But in the presence of such a process a thrombosis might, as in the following cases, be followed by a hydrocele of the cord, which, because of its rapid growth,

might and doubtless does overshadow its cause, namely, a thrombosed vein.

Case V.—Father M. K., aged fifty years, parochial priest. Was first seen November 24, 1906. For eight years he has had a right reducible inguinal hernia for which he has worn a truss. Ten days ago there appeared in the right inguinal canal a hard, tender mass which has prevented him from wearing the truss. Notwithstanding this the rupture has not descended. Within the last two days a second swelling causing much pain appeared in the upper part of the scrotum.

Physical examination shows a well-nourished man, well except for local condition. On inversion of the scrotum an irregular nodular tumor can be felt in the inguinal canal which is very firm and rather tender. Below this, in the upper part of the scrotum, there is a swelling as large as a plum, of uniform outline and very sensitive. The tip of the finger passed through the inguinal canal above the upper swelling readily enters the abdomen, and an impulse on coughing can be readily felt. The diagnosis of thrombosis with secondary cyst formation in the cord was made.

Operation at the Good Samaritan Hospital, December 1, 1906. On splitting the aponeurosis of the external oblique, as in the ordinary hernia, there was exposed in the cord a thrombus in process of organization. The vein above the thrombus was patulous. The clot measured one and one-quarter inches in length, and three-quarters of an inch in width. It was of dark-redcolor and of uniform consistence and outline. Below it there was a hydrocele of the cord containing perfectly clear fluid and with a sac of uniform surface and clothed with endothelium. The hernial protrusion of the peritoneum was separated by a considerable interval from the uppermost portion of the thrombus. The specimen is herewith presented. The thrombus and hydrocele of the sac were easily excised, and the hernia treated in the ordinary way. Recovery was uninterrupted. There has been no recurrence either of the hernia or of the hydrocele.

Case VI.—Miss R. F., aged twenty-eight years. Entered the Jewish Hospital, February 18, 1907. Has been well until four months ago, when after a severe strain she felt considerable pain in the right inguinal region. Although it caused her to limp some, it did not keep her from her work as a saleslady. She had quite forgotten this seemingly trifling condition, when about December 1 she noticed a swelling in the groin which gradually increased in size and without any special symptoms. When lying down it disappeared. A physician was consulted, who advised the wearing of a truss. She continued to wear this for about two weeks without benefit.

Physical Examination. Well-developed young woman, in excellent health except for the local trouble. Occupying the upper part of the right labium majus and the inguinal canal, there is a rounded swelling with long axis parallel to Poupart's ligament. Above the latter, nearly to the superior spinous processes, a marked fulness is perceptible. On lying down the swelling of the labium disappears either spontaneously or on pressure, and the examining hand on the abdomen can readily feel the distention of the upper portion of the sac. A distinct impulse on coughing exists. With the patient standing the translucency of the labial part of the sac is easily demonstrable.

The diagnosis of hydrocele of the round ligament was made. The operation was performed on February 19, 1901. The sac was easily exposed and appeared lobulated by reason of its constriction at the ring. The labial portion of the sac was easily enucleated. The intraparietal portion, however, was deeply adherent to the parietal peritoneum from which, however, it was dissected without wounding the latter. Its firmest connection was with the round ligament where a firm, reddish cord, still seen in the specimen, may have been what remained of the thrombosed vein. After the operation the cyst, which appeared bilocular before, was shown to be unilocular. It was very thin-walled and evidently of the round ligament. The operation was concluded as an ordinary hernia.

That the obstruction and thrombus formation is oftener of another vein than the spermatic, is evident by the relative frequency with which cysts are found in connection with irreducible hernias. A mass of omentum adherent at the neck of the sac, or an obstructed appendix, will not infrequently be found associated with the separation of a part of the hernial sac from the larger portion above and the effusion into it of a serous liquid. What comes on in a rapid way in a strangulated omental hernia during the first few hours, is of slow development in these chronic cases. In the latter there is never any admixture of the fluid with blood. Quite recently I saw a young man with a hernia which had been retained by a truss. A few weeks before he came for observation a rather large swelling formed just without the external ring. It was as large as the end of the thumb, smooth in outline, and ovoid in shape. It was distinctly translucent and irreducible. In the inguinal canal there could be felt an irregular mass, seemingly a protruded fold of omentum, which had become adherent.

In contradistinction to these cases of cysts of the inguinal canal and of the upper portion of the spermatic cord, which, in my judgment, are the result of either venous obstruction or of thrombosis, are the cases in which the history of trauma or of a pre- or co-existing hernia cannot be obtained. These are cases in which the cysts of the spermatic cord or of the round ligament develop quickly, and at times with symptoms violent enough to suggest a hernial strangulation.

An analysis of the cases which have come under my observation, and of which I have four specimens, shows them to be thin-walled, lined with a flattened epithelium, and containing a clear fluid characteristic of the ordinary hydrocele. The question arises whether, in cases of ordinary hydrocele of the cord, anything else can enter as an etiological factor than the embryonic rests of the vaginal process from the peritoneum through which the testicle descends or the round ligament passes.

So far as I know, the theory that these cysts may be overgrowths from vestiges of the Wolffian bodies has nothing to support it. It is questionable, too, whether a hydrocele can occur in the cellular tissue of the cord or of the round ligament without any preëxisting virtual cavity, such as a partly obliterated vaginal process. In women, particularly, it has been questioned whether a hydrocele of the canal of Nuck is an anatomical possibility. The studies of a number of German anatomists seem to have established the existence of such a process. Although its patulousness is far less common than it is in male children, Bergmann found it open along its entire length in 5 and partly so in 12 subjects between one month and three years old. Furthermore, it is unusual for cysts, except as a result of trauma, to develop in cellular tissue. The analagon of a hydrocele in the neck is nearly always a branchial cyst. Cysts in the inguinal canal, unless formed in a sequestered portion of the sac of a hernia, with or without thrombosis as an etiological factor, are practically always the result of an exudation into the preëxisting unobliterated portion of the vaginal process. That most of these cases occur in the young is explained on this basis. That it may occur in the old is shown by a specimen herewith presented and removed from—

Case VII.—D. L., male, aged sixty-one years. Was well until a year ago when there appeared a swelling in the right inguinal region. With ordinary symptoms of a reducible hernia there gradually developed an irregular growth in the inguinal canal and projecting into the scrotum. For about six months before the patient came under my observation the mass had become irreducible.

Physical Examination. Very well-preserved and rugged man without other blemish than the local condition referred to. Occupying the region of the inguinal canal and the upper part of the scrotum there is an irregular mass, elastic to the touch and presenting a distinct impulse on coughing. It was entirely irreducible. Because of the ease with which the mass

was shown to be translucent, the diagnosis of hydrocele of the cord was made. The operation at the Good Samaritan Hospital, March 28, 1898, revealed a cyst conglomerate extending within the abdominal cavity and pushing the peritoneum before it. The individual cysts varied in size from a peach to a bean, but did not communicate with each other. They were filled with a particularly clear fluid, and were lined with the flattened endothelium of serous sacs. The operation was completed as an ordinary hernia.

It is impossible to state what, without the history of an injury, could have caused an effusion into these embryonic peritoneal rests after more than sixty years of an inoccuous desuetude. A case has been recorded by Cenas (quoted by Broca) in which, during an attack of acute articular rheumatism, a hydrocele of the spermatic cord developed which completely subsided with the disappearance of the general infection. My patient did not have rheumatism.

It is rather difficult to account for the multilocular development of the cyst in the case presented. It is not unlikely that vestiges of the vaginal process, irregularly distributed along the cord, developed simultaneously into separate cysts without communicating with each other or with the general peritoneal cavity. It is characteristic of a true hydrocele of the spermatic cord that it has not any communication with the peritoneal cavity, in contradistinction to the open hydrocele, which rapidly or slowly may empty itself into the abdomen and disappear. A seeming reduction of the tumor into the abdomen may take place in the true hydrocele of the cord or round ligament, when, as in Case VI, a large portion of the cyst is above the internal ring and yet on the outside of the peritoneum between it and the muscular portion of the abdominal wall in front. These are the so-called bilocular hydroceles, a part of which appears in the labium or the upper portion of the scrotum and the other portion above the internal ring, and yet separated from the abdominal cavity by an intact peritoneum. It appears that in these cases, by the

upward growth of the true cyst, the parietal peritoneum is dissected away from the anterior wall in front much as it is in the intraparietal forms of hernia. Indeed, in many of the cases of bilocular hydrocele hitherto recorded, there has been found, as in properitoneal hernias, some anomaly of position of the testicle. Diverticula of the vaginal process, added to the great mobility and ease of displacement of the peritoneum about the internal ring, will readily account for the disappearance of the bilocular inguinal hydrocele. Its appearance during early life and in the young supports the view that in many cases there is an anatomical congenital anomaly as a basic factor.

In the above considerations, cysts of the lower part of the cord and those in conjunction with the testicle have not been considered. Like the organ of Giraldes, an embryonal rest of the Wolffian body, cysts may develop in connection with the upper part of the epididymis from this structure. They never, however, extend to the inguinal canal and are closely fixed to the testicle.

Nor has more than reference been made to the cysts of the inguinal canal and the upper part of the scrotum, which are due to the sequestration of a portion of a hernial sac and the accumulation within it of a serous transudate. The condition of a hydrocele in a part of a hernial sac is often enough encountered and thoroughly understood.

The diagnosis of thrombosis and of hydrocele of the cord within the inguinal canal and projecting beyond the external ring should, under ordinary circumstances, present no difficulties. In the cases of thrombosis above described the diagnosis was easily made, and in the hydroceles which followed or developed without preëxisting thrombosis the light test sufficed to clear up any doubt which might have existed. Nevertheless, thrombosis of the spermatic veins and an acute hydrocele may set on with such severity of symptoms as to simulate almost in every particular a strangulated hernia. In exceptional cases, too, a differential diagnosis between

thrombosis of the cord and thrombosis of an omental protrusion cannot be positively made until the parts are exposed by operation. Fortunately, in either event, an error in diagnosis would only accrue to the benefit of the patient, in that an early operation would be insisted upon and probably performed.

The treatment of the conditions under consideration is simple enough. In the milder cases of thrombosis, expectant treatment is indicated. In those of larger dimensions, following a trauma or in which, from the size of a hematocele, a positive diagnosis from hernia cannot be made, an operation is indicated. In hydroceles the older methods of aspiration and of injection have been rightly discarded. Complete excision of the sac is the only advisable procedure. Although, in a considerable proportion of cases (as in the bilocular), the enucleation would involve the properitoneal space the operation does not present insurmountable difficulties. In hydroceles resulting from sequestration of a portion of the sac, the operative treatment is that of an ordinary hernia. It is almost needless to conclude with the injunction that the operation, when complete, must leave the inguinal segment of the abdominal wall as competent to resist pressure as after the ordinary hernial operation.

DISCUSSION.

Dr. Mack Rogers, of Birmingham, Ala.—I want to add the report of a case that came under my observation a few years ago. A boy, aged three years, developed a hydrocele in the canal, which I recognized and dissected out without rupture and was lucky enough to preserve it. There was no special difficulty connected with the operation, but I simply report it an as addition to the literature.

HERMAPHRODISM: REPORT OF A CASE.

By George Ben Johnston, M.D.,
Richmond, Va.

Hermaphrodism is defined as the bisexual development of one individual. It is divided into true hermaphrodism, in which both male and female organs of generation coëxist in a single individual; and false hermaphrodism, in which the genital organs of an individual appear more or less like those of the opposite sex. It is said that a perfect true hermaphrodite with functionally active glands of both sexes has never been discovered in the case of human beings, although this condition occurs in lower animal and plant life. Instances of false hermaphrodism are not very uncommon, and are due to congenital defects of the structures that form the external genitalia. In addition to these two classes there is a third group of cases which may be termed partial hermaphrodism, in which an individual possesses some, but not all of the organs common to both sexes. It is just such a case as this that I wish to report.

Partial hermaphrodism; male with uterus masculinus, Fallopian tubes, and ovo testes. S. W. S., aged twenty-three years, of Virginia, white, married, occupation, farmer.

The family history does not appear to be of importance. Father living, suffers with rheumatism. Mother died of tuberculosis. One brother and one sister alive and well, four dead, causes not known. The patient has been married four years, and wife has not been pregnant.

The patient's past history shows that he has never had any

serious illness except a fever four years ago which confined him to bed for one month. He has suffered in the past with epistaxis, but this has occurred at no regular intervals, and he has not had any bleeding from the nose in the past year. No history of venereal disease; no urinary disturbances. He has considered himself quite well and of normal sexual desires. He has always been aware of the fact that the scrotum did not contain the testicles, and for the last fifteen years he has noticed the presence of a small lump in the right inguinal region. On exertion he found that the swelling increased in size, and would partially extend into the scrotum. When this occurred he would be able to reduce it by lying on his back, elevating the leg, and using some force which always caused considerable pain. Eight years ago he was given a truss which he has worn since, and has been able to follow his occupation of farming. No swelling has ever appeared on the left side.

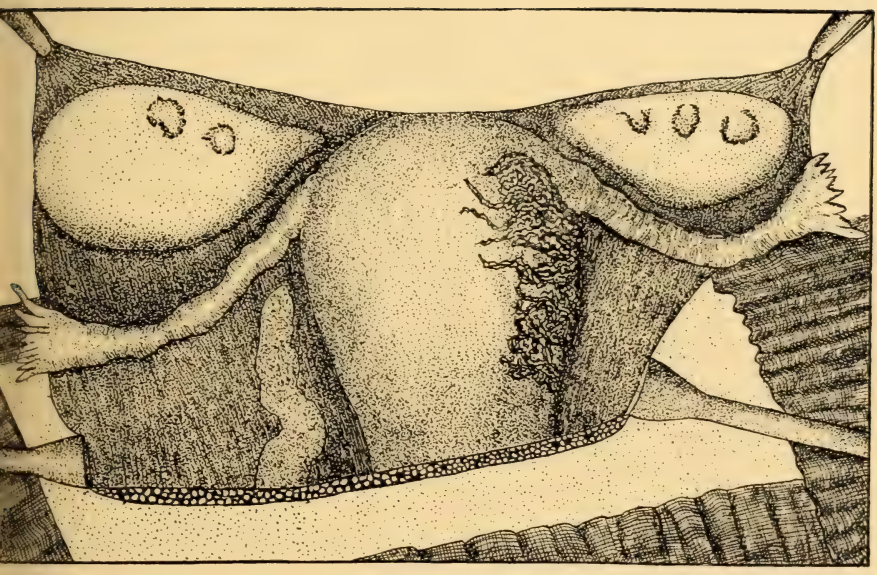
Physical examination showed an individual with a large frame, good muscular development, broad shoulders, narrow hips, and large hands and feet. Good growth of beard on lower face. Breasts not enlarged. The external genitalia appeared to be normal for an adult male, except that the scrotum contained neither testicle. The penis was natural in size, and the scrotum large and well formed. In the right inguinal region there was a mass about the size of a small hen's egg, which was distinctly tender on pressure. This could be readily defined by passing the finger into the inguinal canal, was firm and rounded, and descended on coughing. The left canal easily admitted two fingers, but no mass or hernial protrusion was noted. The clinical diagnosis was right inguinal hernia; undescended testicle.

Operation was performed October 30, 1907, under ether anesthesia. The usual incision was made and the inguinal canal exposed. A process of peritoneum was found in the canal, and this was opened disclosing a fibrous cord which was surrounded by a sheath containing a few enlarged veins

showing but slight varicosity. Gentle traction was made on this cord to see if the testicle could be brought down, with the idea of replacing it in the scrotum. As some little difficulty was encountered in this maneuver, firmer traction was made which brought down the rounded body into the incision, but immediately following this came a fleshy mass the nature of which was at first not understood. This mass was then drawn out into the incision, and we were very much astonished to find that it was followed by a globular body, and that on the opposite side of this there was a similar fleshy mass to that found on the right and another rounded body like that present in the right inguinal canal.

As soon as these parts were assembled it was readily seen that we had before us the fundus of a uterus, with broad ligaments, Fallopian tubes, and two glandular bodies.

The body of the uterus was about the size of that found in an adult virgin. The Fallopian tubes were patulous, so as to admit the passage of a probe, and were perfectly formed, each having at its lateral end an infundibulum and fimbriated extremity. The two glands were oval and slightly flattened, corresponded in size and appearance to normal ovaries, showed some slight scarring, and each presented several small cyst-like elevations resembling Graafian follicles on the surface of an adult ovary. There was no evidence of an excretory duct leading directly from either of these bodies, and neither of them showed any structure resembling or suggesting an epididymis. The finger passed downward behind the uterus came in contact with a slight dilatation after the region of the cervix was reached, but as these manipulations were simply made through the enlarged internal ring, the exact detail of the structures, deep in the pelvis, could not be outlined. The accompanying illustration is from a pen-and-ink sketch made by Professor Henry Winston Harper, M.D., of Austin, Texas, who was present at the operation and to whom I am much indebted for his accurate portrayal of conditions as seen at the time.



As there was no justification to mutilate this patient in any way none of these organs were removed, so that I am unable to report on the histological structure of any of the tissues in question. Quite a number of gentlemen were present at the operation, and all were very much impressed by the exact similarity in appearance of these organs with those of the normal internal genitalia of a healthy woman. The operation simply consisted in replacing these singular structures in the abdomen, closing up the sac of peritoneum, and then repairing the inguinal canal. The patient's recovery was uneventful, there is now no evidence of hernia, and he is quite unaware that his pelvic organs differ in any respect from those of a well-formed man.

A case very similar to this one was reported by Dr. T. W. Webster at the meeting of the Chicago Gynecological Society, April 19, 1907. (*Surg., Gynec. and Obst.*, October, 1907, p. 484.) This case was as follows:

The patient was a farmer, aged about thirty-four years. He was admitted to the hospital with acute abdominal symptoms following the kick of a horse. There was a swelling in the scrotal region, and as he had always had what was considered a hernia there, it was supposed the kick had injured this hernia and that it had become strangulated. An incision was made over the hernia, but instead of bowel or omentum there was found what appeared to be a normal female uterus with ovaries and tubes, the uterus being attached to the prostate. Those parts were removed, and as there was general peritonitis the belly was opened in the middle line, but as the patient was in such a bad condition, practically moribund, nothing was done except to examine the pelvic cavity. The patient died shortly after leaving the table. The specimen consisted of the body of a uterus similar to that one would get after a supravaginal amputation, there being a slight depression of the fundus. There was a Fallopian tube on each side, and two structures in the position of the ovaries and which resembled the latter except that they were much

smoother; they looked like swollen ovaries. On both sides there was a round ligament and a broad ligament; on the left side the latter contained a cyst about three inches in diameter. On dissection a vas deferens was found in each broad ligament close to the uterus. It was small in its upper portion, but increased as it passed downward toward the cervix, where it measured 5 mm. transversely. The two bodies, which looked like ovaries, were not ovaries at all, but testicles; one was up inside the ring, the other in the scrotum. It is impossible for a uterus to reach adult size in the human female without ovarian tissue being present, consequently one can infer that although no ovarian tissue was present in the specimen it must have been present in the man; consequently the case must have been one of true hermaphroditism, of which only a few cases are on record. A small mass was observed resembling an ovary when the abdomen was opened. It was not carefully examined, but there can scarcely be a doubt that it was an ovary. The testicles resemble those of an adult, but no spermatozoa were found. The man in earlier years was the father of twins, so there is no doubt that the testicles were active formerly, at least. There is nothing corresponding to a separate epididymis, but the rete testis opens into a series of convoluted tubules in the broad ligament in a position corresponding to the organ of Rosenmüller in the female, and they communicate with these large tubes (vas deferens or permanent Wolffian ducts) which run down the sides of the uterus toward the cervix. The Fallopian tubes have the characteristics of the female Fallopian tube, except that there is a less marked condition of fimbration at the outer end. One of the fimbræ passes toward the testicle, corresponding to the ovarian fimbria in the female.

False hermaphrodism is really not an extremely rare condition, although any single operator is not likely to meet with a case more than once or twice in his experience. In 1904 Neugebauer (*Centralbl. f. Gyn.*, 1904, No. 2) was able to collect 942 cases of this condition from the literature. These

cases may be classified into: (1) Male pseudohermaphrodites (*i. e.*, individuals with testicles) who show either the development of a uterus masculinus, often with broad ligaments and tubes; or else have some deformity of the external genitalia so that these organs approach the female type. (2) Female pseudohermaphrodites (*i. e.*, individuals with ovaries) who show a persistence of the male sexual parts, either in the formation of a vas deferens or in the approach of the external genitalia to the male type.

In a certain number of instances true hermaphrodism has been claimed for an individual or a specimen, but very few of these will bear scientific criticism for the reason that careful histological examinations were not made. As examples of true hermaphrodism, several of the following cases have often been quoted: Heppner (*Archiv f. Anatomie, Physiologie und Wissenschaftliche Medicin,* 1870, p. 679) reported the case of a two-months'-old premature infant with a rudimentary uterus and vagina, and on both sides a normal ovary, parovarium and tube, and near each ovary was a body resembling a testis and containing tubules running toward the hilum. It is possible that these apparent testes may have been in reality supernumerary ovaries with some abnormality of the parovarium or Wolffian body. Two somewhat similar cases are reported by Obolonsky (*Zeitschr. f. Heilkunde,* 1888, ix, p. 211) and Schmorl (*Arch. f. path. Anatomie und Physiologie,* 1888, cxiii, p. 229), but these are instances of lateral hermaphrodism with an ovary or testis on one side and an ovary and testis on the other. A still more recent example of a similar condition is recorded by Blacker and Lawrence (*Trans. of Obs. Soc.*, London, 1896, xxxviii, p. 265). From these cases it would appear that the occurrence of what may be termed anatomical hermaphrodism in the human subject has been demonstrated.

A very remarkable case of supposed functional hermaphrodism was reported by C. W. Fitch (*New York Med. Jour.*, November 22, 1890). Mention of this peculiar patient,

together with illustrations, appears in several of the recent text-books on gynecology, and, stripped of inaccuracies, this is doubtless a remarkable example of feminine pseudohermaphrodism.

The legal aspects of hermaphrodism has always been much discussed. Many interesting questions may arise, and extraordinary complications naturally occur. There are cases of hermaphrodism in which the sex cannot be declared during life. Such cases are classed under the head of neuter hermaphrodism, and in the history of medicine not a few instances of this condition have been the cause of great disputes, with an array of medical and legal talent on each side, so that in some cases an individual has been given contradicting certificates as to sex.

The cause of malformation of the sexual organs, as of all other kinds of monstrosity, is still involved in mystery. We know that in the early part of uterogestation the sex of a fetus cannot be distinguished; while even when it has reached the fourth month the genital organs are so similar that the sex can seldom be determined on inspection.

Some organs, or parts, appear to be formed by equal and symmetrical portions, which gradually approximate and unite in the median line of the body. We observe this mode of union in the bones of the head, chest, and spine, as also in the various fissures or raphes of the skin. Defects in organization almost invariably occur in or about some part of the median line, and they appear to proceed from an arrest of growth or development of those particular parts, either on one side or both, during the stage of uterine existence.

On the other hand, the development of the specific organs of one sex in the body of an individual possessing preponderating characteristics of the opposite gender cannot be explained as readily as the instances of defective development. In the light of our present knowledge we can only attribute such an occurrence to the deposition of a curious *anlage* in fetal construction.

DISCUSSION.

Dr. Albert H. Freiberg, of Cincinnati.—I would like to ask Dr. Johnston whether a normal prostate gland could be made out by rectal examination?

Dr. Johnston.—We could not make out any prostate. The patient was a young man.

Dr. Freiberg.—So far as you could tell, there was no prostate there?

Dr. Johnston.—We could not detect any prostate by rectal examination.

RETROPERITONEAL CYSTIC ADENOMATA: REPORT OF TWO CASES.

By I. S. Stone, M.D.,
Washington, D. C.

Retroperitoneal tumors of uterine origin are usually solid, and make their exit from their bed within the uterine muscle to the retroperitoneal space by way of the broad ligaments. These tumors may become transformed into some one of the malignant varieties or merely undergo cystic degeneration. The presence of certain retroperitoneal cystic tumors having cylindrical epithelial lining, or evidence of glandular formation, has been noted by many writers, notably by Recklinghausen. These tumors have been observed by surgeons from time to time, and have often been mistaken for dermoid or ovarian tumors because their histological character was not studied. It may be taken for granted that all tumors have a definite origin, and it is interesting to note that the variety under discussion is now, by general consent, thought to have its origin within the uterine wall in certain remnants of the Wolffian bodies. A glance at our abdominal operation list shows many solid tumors of glandular origin, generally sarcomata or myxomata, which are located behind the mesentery above the pelvic brim or far above that point. But very seldom have cystic tumors been seen in this location unless, as above mentioned, after some degenerative change in the tumor. On the other hand, it has not been such a rare event to find cystic tumors which are or have been connected in some way with the uterus or

ovary. In passing we call attention to the very great importance of investigating every tumor found behind the peritoneum, and especially such as are found in women having both ovaries in normal position and condition. It is among these that we will find those of embryonic origin—the "cystic adenomata."

A comparatively recent case is of interest, as it occurred in a woman brought to our attention during our vacation last summer. The patient was aged sixty-five years. She had been in poor health eleven years and was somewhat emaciated and anemic. Ner abdomen was very large in the lower half, and she had developed obstipation of the bowels owing to pressure of the tumor upon the sigmoid. We made a tentative diagnosis of cystic degeneration of a parastic or migrant tumor.

The tumor filled the entire pelvis and lower abdomen. The latter was very pendulous, and the tumor appeared to be firmly planted in the abdominal cavity. The diagnosis was not clear and satisfactory before operation. The cervix was very high in the pelvis, and what we thought the fundus uteri proved to be a calcification of either a part of the cyst wall or else of a wandering fibroid ("parasitic" or "migrating" tumor). This deceptive mass was located just below the umbilicus in the median line, and was broader and longer than the normal uterus and of about the average thickness. The presence of the intestines over the upper part of the tumor gave a resonant note on percussion, and, while we were sure of the presence of fluid, we were unable to make a positive diagnosis.

Operation. The incision was made very long, 20 cm., reaching from the pubis to 5 cm. above the umbilicus. The intestines appeared in the wound when the parietal peritoneum was divided. The sigmoid extended obliquely across the tumor, which had separated its mesentery. We found it necessary to sacrifice a portion of the parietal peritoneum in order to remove the calcified growth above mentioned.

The growth securely fixed the tumor to the parietes. It was at first impossible to locate the small uterus or bladder. These organs finally came in view when the cyst was shelled out. The cyst was not ruptured, and comparatively few vessels required ligatures.

We found a very rudimentary uterus and other sexual organs. It was, however, possible to find both ovaries and the Fallopian tube of the right side. The changes wrought in the broad ligament and Fallopian tube of the left side were so great as to practically obliterate the greater part of those organs.

The replacement of the viscera was satisfactorily accomplished, and the patient was returned to her bed in good condition and made an excellent recovery.

The cyst was opened and presented some of the appearances usually seen in ovarian papillomata. Many clusters of smaller cysts and grape-like projections were seen jutting into the interior. These were hard, were firmly attached to the lining of the large cyst, and appeared to be a part of the cyst wall. The fluid, which was of chocolate color, gave us but little information regarding the nature of the growth. It contained both red and white blood cells in great numbers.

Situation. This tumor, undoubtedly, had its early origin in the uterus and was extruded under the peritoneum into Douglas' cul-de-sac. It was, therefore, in what may be called the "proximal part" of the Wolffian body (Hartz), and was separated from the rest of that structure, although Recklinghausen says such a thing rarely occurs, and he has never seen a separate adenoma of any kind in the broad ligament or in the region of the epioöphoron.

Breus has reported two similar specimens of retroperitoneal voluminous cystadenomata which Recklinghausen pronounced embryonic remains of the Wolffian body in the uterus.

The specimen we removed shows a very mixed variety of structure, some of which resembles ovarian stroma. But

we located both ovaries in their proper position, although they were very small, having ceased to functionate twenty years before.

Pick has reported a similar case which appeared to have what he calls peripheral growth or swelling.

Besides the above explanation of the presence of tumors in this locality, we find that Breus thinks one of his specimens originated in an unobliterated Gartner's canal. This is, however, largely speculative.

We think our specimen a "para-oöphoral adenomyoma" with structure closely resembling ovarian tissue, and that it originated, as suggested by Recklinghausen in most cases, on the posterior wall of the uterus.

The "brown-red" color has been mentioned by writers as typical of this variety of tumor, which shows up in "streaks and spots," due to extravasations of blood.

Certain tumors of this class contain muscular tissue in varying proportions. Our slide shows some of this tissue and this proves that the tumor is probably of a mixed origin, as it would surely not contain such fibers if its origin and development were purely "Wolffian." Besides, these tumors usually grow at a mature age, thirty-six to forty years or later.

A second recent case has occurred in my practice which presents some rather interesting features because of its location. Mrs. L., aged twenty-six years, had menorrhagia and had been treated by curettement two months prior to our first examination on October 1, 1907. Examination of pelvis showed a mass on the right side of her uterus which we thought an enlarged ovary, which was prolapsed and adherent. The mass was strikingly low down, but we confess that we thought it a cystic ovary. At the operation, October 4, 1907, we were at first surprised not to find the ovary involved in the least, but we found a cyst behind the peritoneum about the size of a lemon, occupying a position below and close to the ureter and between it and the uterus. The dissection was effected without rupture and was not unusually difficult. Its enu-

cleation was greatly facilitated by its elevation from the vaginal side, an assistant using his hand for this purpose. This cyst was not in the broad ligament, but was posterior to it and appeared to be independent of it. We were prepared to find a dermoid cyst, but instead found one with thin, clear walls and without the chocolate-colored fluid which was contained in the former specimen. Microscopic examination showed cylindrical epithelial lining, and we therefore believe this specimen another one of those rare cysts which develop in the uterus and become displaced into the adjoining connective tissue by reason of some vis a tergo, probably a muscular or mechanical force in the uterus.

Dr. A. Hartz, of Karlsruhe, *Berlin. Monatsch. f. Geb. u. Gyn.*, 1899, ix, "Ein Cystöser Tumor (Cystadenom) an der hintern Bauchwand entstanden aus Resten des Wölffischen Körpers" (seen in the Sanger clinic) reports a case of a thirty-four-year-old patient; sick five years; symptoms of typhlitis or peritonitis. Abdomen size of eight-months' gestation. Apparently a left-sided ovarian tumor. Sänger saw it and said: "That is no pregnancy in the uterus; no myoma; no ovarian cyst; no ectopic pregnancy, but something else." This tumor was, like mine, under the peritoneum, attached to the uterus and mesosigmoid.

HEMATURIA IN PREGNANCY.

By Edward A. Balloch, M.D.,
Washington, D. C.

The older literature of medicine contains many references to "idiopathic" or "essential" hematuria. Under this head were classed cases of renal hematuria for which no adequate cause could be assigned. As the kidney became more and more the subject of surgical intervention and critical pathological study, it was found that in nearly every instance, although the affected kidney might appear macroscopically normal, there were microscopic changes sufficient to account for the hematuria.

Before accepting the possibility of "hemorrhage from a healthy kidney," a position maintained by Klemperer and others, it must be shown (1) that the hemorrhage is really from the kidney, and (2) that there is no possibility of any change, however minute, in the kidney structure.

The first requirement is easy to satisfy, but in order to be able to answer the second in the affirmative it will be seen that every part of the kidney must be subjected to the most searching scrutiny by good pathologists.

Applying these tests to the reported cases there are but two (Schede and Klemperer) that fulfil them. In each of these cases the hemorrhage ceased after the removal of the kidney, and a painstaking examination of the removed organ showed no departure from the normal. Even here one cannot escape the suspicion that the underlying lesion was overlooked, as in the case of Nicholich,[1] in which nephrectomy

was performed for continuous unilateral hematuria of four months' standing. To the naked eye the kidney appeared normal, and the examination of a section by a reputable pathologist of Vienna showed nothing abnormal. Some time later a further examination of several sections was made by Motz and Albarran, who found well-marked lesions of chronic nephritis.

To account for the hematuria in these cases where no adequate cause appears, two principal theories have been advanced, which may be called for convenience the angioneurotic and the chronic nephritis theories.

The first, championed by Klemperer and others, ascribes the bleeding to vasomotor changes affecting the renal vessels. Advocates of the second theory maintain that in nearly every case of obscure renal hematuria the bleeding is due to the changes in the kidney incident to chronic nephritis. Those holding this view insist that hematuria may be the first sign of chronic nephritis, and that it may antedate by many years the appearance in the urine of albumin and casts.

A study of the more recent literature of this subject shows that the latter theory is steadily gaining ground. It has for its supporters most of the surgeons and the ablest pathologists. Its advocates consider that the nephritis may be diffused or circumscribed, and that in the latter case its detection may be extremely difficult.

This is well known in one of Albarran's cases, where the kidney was exposed and found enlarged and congested. At first nothing abnormal was found, but in a more careful search a minute, grayish nodule was seen at the base of one of the pyramids. This was removed and found upon examination to show the lesions of chronic nephritis.

Rovsing,[2] in a critical examination of the subject, calls attention to the part played in these cases by movable kidney, and cites four cases of his own to sustain his contention. He calls attention to the fact that in several of the published cases described as "renal hemophilia," the kidney was mis-

placed. He ascribes the bleeding to stasis, brought about by tight lacing or twisting of the pedicle.

Cabot[3] also reports an interesting case of severe hematuria due to movable kidney. This patient was placed in bed with her shoulders lowered and hips raised. At the end of forty-eight hours there was marked decrease in the amount of blood in the urine, and in a short time it disappeared entirely. A few days later the patient was allowed to lie flat for four hours; on the next day blood appeared in the urine. The original position of the patient was resumed and she was kept in it for several weeks, after which she was allowed to sit bolstered up in bed for twenty minutes each day. This was immediately followed by the appearance of blood in the urine. The kidney was then exposed and, except for a thickened capsule, appeared normal. It was fixed to the transversalis fascia. This was followed by complete relief from the hematuria and all other symptoms.

Cabot discredits the theory of twisted pedicle as a cause of the congestion, and states that, in his opinion, it is a very rare condition. He believes the cause of the congestion to be a slipping downward of the entire organ, which causes an obstruction of the thin-walled vein while the thicker and more resistant artery escapes.

The explicable causes of renal hematuria are numerous. Fowler,[4] in his able monograph upon which I have drawn freely and to which I cheerfully acknowledge my indebtedness, divides them into local and constitutional. Among the former are inflammation, embolism and thrombosis, traumatism, retention, abnormalities, parasites, tuberculosis, diseases of the blood, intoxication and poisons, pregnancy, and lactation.

A study of those causes shows that some disturbance of the circulation in the organ is the underlying cause in most of them, and that this disturbance is in the nature of stasis or congestion.

In the case I have to report the rapidly recurring pregnancies were undoubtedly the cause. It is as follows:

Mrs. L. V. G., white, aged thirty-one years, came under my care in October, 1906. She was a native and life-long resident of a malarious section of Virginia. Family history unimportant. Personal history: Never very strong. Had enlarged cervical glands in left side when a child. Scar remains. Married at twenty. Has had seven children; six living and well and one dead by accident. Two miscarriages. One year ago spat some blood, but does not know where it came from.

Present Illness. First noticed blood in urine four years ago. This came on in February while she was pregnant, and lasted ten days. Child was born in March. There was no hemorrhage during the next pregnancy, but in December, 1905, while pregnant with her last child, the hematuria again appeared and has continued without intermission since, the child having been born in March, 1906. The hematuria has been more profuse at times than at others, but has never ceased entirely since December, 1905. No history of renal colic. During past year has suffered from heaviness and stiffness in left side just under ribs, and has been sore to touch in that locality. No malaria. Swelling of feet has existed pretty constantly since first pregnancy. It is worse when she is pregnant, and has never entirely disappeared.

Examination. Frail and anemic woman. Pulse weak and rapid. Lips and mucous membrane blanched. Lungs and heart normal. Marked soreness on palpation over left kidney, but no enlargement detected.

Urine. Specific gravity normal. Albumin present (due to blood). Microscopically, abundant red blood cells. No pus. No casts seen after diligent search.

Cystoscopy by Dr. H. A. Fowler. Bladder normal. Ureters normally situated. Openings normal. From left ureter bloody urine oozes with each contraction of trigone on that side. The jet is not thrown out with usual force, but oozes down over trigone. Fluid from right kidney normal. Catheter in right ureter passes two-thirds of the way to the kidney.

As this patient had been under the care of reputable physicians, who had exhausted all medical means for her relief, and as the continuous loss of blood was evidently telling on her, a nephrectomy was advised and accepted.

Operation, October 30, 1906. Kidney easily exposed and found to be small with a pale, non-adherent capsule. Two patches of subcapsular hemorrhage. Dense adhesions about upper pole which had to be divided before kidney could be removed.

Postoperative History. Patient made a good recovery. Immediately after her return home she again became pregnant and again blood appeared in the urine. After the birth of the child, which was uneventful, the blood disappeared from the urine and has not reappeared since. She states that she feels well.

Summarizing, we have a history of rapid child-bearing with hematuria appearing during the fifth pregnancy and lasting ten days. It skipped the sixth pregnancy only to appear again during the seventh and never ceased after that. Another pregnancy immediately followed the removal of the left kidney accompanied by hematuria, presumably from the remaining kidney, which ceased when the child was born.

Pathological Report. The kidney was sent to the Army Medical Museum. The report of Captain Russell shows thickening of the capsules of the glomeruli with unduly prominent endothelium. The tufts are congested and show proliferation with a few polynuclears present. The capsules contain an albuminous exudate, a few tissue cells and an occasional red blood cell. In one section there is a small area in the cortex just beneath the capsule which shows several glomeruli which have undergone hyaline degeneration and become completely obliterated. At this point the capsule is adherent, dipping down into the cortex by a coarse band of connective tissue. There is marked infiltration of small round cells in this area. The picture here presented is that seen in small granular kidney.

The epithelium of the convoluted tubules shows a general albuminous degeneration. None of the cells shows a regular outline, and the nuclei of many of them fail entirely to take the stain. There is very little desquamation. The lumina almost invariably contain detritus, which is homogeneous in appearance and stains brightly with eosin. In some cases the coagulum distends the tubules so that, practically, we have casts. In a cross-section of one of the pyramids it will be noted that there are areas in which there is an interstitial proliferation accompanied by a congestion of the capsules and the presence of an exudate, which in appearance is homogeneous.

The most marked changes observed in the sections, as a whole, are: (1) Those confined to the glomeruli, which are characteristic of glomerulonephritis, and (2) the peculiar patchy increase in the interstitial connective tissue seen in the cross-section of the pyramids.

Remarks. There can be little doubt but that the renal changes in this case, leading up to the hematuria, began during the first pregnancy. In this connection the history of the edema of the feet since then is significant. Owing to the rapidity with which one pregnancy followed another the kidneys never had time to recover from the strain put upon them, until the conditions present culminated in a chronic congestion which produced the hematuria.

The appearance of blood in the urine, after the nephrectomy, may be explained in two ways. It may be assumed that with only one kidney to take care of the excretory products of pregnancy, and that kidney one that had not time to compensate for the loss of its fellow, the tax on it was too great and a congestion resulted. Or this appearance of hemorrhage from the second kidney may be accepted as a proof of the statement of Casper, that, although the hematuria may be unilateral, the nephritis of which it is a symptom is always bilateral.

This case also shows the comparatively slight effect of a

nephrectomy upon subsequent pregnancy. It is the second instance in my experience where pregnancy has followed a nephrectomy, and in neither was there any noticeable effect from the removal of the kidney. In this case the pregnancy followed so closely upon the nephrectomy that any untoward results would surely have shown themselves. Baldwin[5] has noticed the same fact, and reports two cases of his own and three from literature to show that the prognosis of pregnancy after a nephrectomy is by no means unfavorable.

Since it seems to be established that the hematuria of pregnancy is a symptom of chronic nephritis, it is pertinent to inquire as to the cause of the nephritis. The generally accepted opinion is that the renal changes in pregnancy depend upon perverted metabolism, and, consequent, autointoxication. The perverted metabolism may be of maternal or fetal origin, or both.

It is only fair to state, however, that certain authorities ascribe a prominent part in the nephritis of pregnancy to dilatation of the ureters from compression. That this compression does exist in pregnancy has been demonstrated by Halbertasma and Leyden, and some authors make Cruveilhier the father of the statement that during his service at the Maternity Hospital all women who died during pregnancy, or shortly after delivery, had dilated ureters. The condition, however, must be rare as compared with the number of cases showing renal changes. Bouman[6] analyzes seventeen cases of hematuria in pregnancy. The blood in all cases was from the kidney and disappeared after delivery, in several cases reappearing during the subsequent pregnancy. Commenting on the various theories as to the causation of the hematuria in these cases, he dismisses the idea of "essential hematuria" as unscientific and untenable; considers briefly the hemophilic and angioneurotic theories, and concludes that his analysis of seventeen cases shows that chronic nephritis is the underlying factor in nearly every one. In his opinion there are renal changes in these cases before conception and pregnancy

aggravate these changes through congestion or auto-intoxication.

Gaucher and Sergent,[7] in discussing the nephritis of pregnancy, consider that the condition depends upon auto-intoxication and that it is intensified by each recurring pregnancy until finally the condition becomes chronic and incurable. The postmortem examination of kidneys in these cases shows either small and granular kidneys with cysts, or large, white kidneys without cysts or granulations. Histologically, islands of sclerosis are found. They report five cases to prove that nephritis may date from pregnancy. Their conclusion is that nephritis of gravid women of autotoxic origin, and, therefore, primarily epithelial, becomes a mixed nephritis under prolonged intoxication, with a progressive tendency to predominance of interstitial changes.

Diagnosis. In the diagnosis of renal hematuria the cystoscope is invaluable. By its aid we can learn from which ureteral orifice the blood is escaping, and also make ourselves certain as to the presence of a second kidney. Supplementing the cystoscope by the ureteral catheter, we can determine that the blood is from the kidney and not from the ureter, and an analysis of the separate urines can be made.

Treatment. The surgical treatment of these cases comprises decapsulation, nephrotomy, and nephrectomy. The single case reported by Young, of the cure of this symptom by the injection of adrenalin solution into the pelvis of the kidney through a ureteral catheter, is not sufficient to form a foundation for any generalization as to its permanent efficiency, although I see no reason why it should not be tried before resorting to a cutting operation.

A study of the cases treated by operation shows that the hemorrhage has ceased just as promptly after decapsulation (Freeman) or nephrotomy (Chetwood and others) as after nephrectomy, and one is forced to the conclusion that it would be better to give nephrotomy or decapsulation a trial before resorting to the more severe operation. This would be my

own inclination should another similar case come under my notice. If the hematuria be due to nephritis it is certainly important to save as much of the kidney tissue as possible, with the view to prolonging the life of the patient.

REFERENCES.

1. Nicholoich. L'assn. Francaise d'Urologie, 1901.
2. Rovsing. Brit. Med. Jour., May 19, 1898.
3. Cabot. Boston Med. and Surg. Jour., March 6, 1902
4. Fowler. Johns Hopkins Hospital Reports, vol. xiii.
5. Baldwin. Cleveland Med. Jour., May, 1903.
6. Bouman. Monats. f. Geb. u Gyn., June, 1902.
7. Gaucher and Sergent. Rev. de Méd., January 10, 1901.

THE PRESENT STATUS OF GASTRIC SURGERY, WITH ILLUSTRATED CASES.

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It is but little more than twenty-five years since the first gastro-enterostomy was performed. Since that time, after many modifications and the employment of numerous methods of suture and a variety of mechanical aids to anastomosis, this operation has found a permanent place in the treatment of stomach disorders. The persistent regurgitation and vomiting of food, bile, and intestinal secretion, which occurred so frequently after this operation as first performed, are now comparatively rare. This result has been reached only through the failure of many suggested procedures for the prevention of the vicious circle.

It seems strange that so many and such complicated operations should have been tried, and yet the desired result obtained with such slight change from the original posterior gastro-enterostomy (Van Hacker), consisting in making the anastomosis a little nearer the cardiac end of the stomach than had been customary. As a result of the operation having gone through this experimental stage, as it were, the technique has been so simplified and its annoyances and difficulties so guarded against that those who follow the pioneers in this field find their task greatly lessened.

It is quite true that the operation of gastro-enterostomy is not ideal, and that it is in many cases purely a mechanical palliative measure in that it provides an escape for the contents of the stomach into the intestine, thus preventing overdisten-

tion of the organ in cases of stenosis, and in cases of ulcer or cancer at the pyloric extremity relieving the part from irritation of food, etc. The fact that gastro-enterostomy is only a palliative measure accounts in part for much of the opposition to the employment of surgical treatment in cases of ulcer. We have a proceeding, as yet little employed, which seems likely to revolutionize the treatment of gastric ulcer, and that is excision of the ulcer-bearing area—not only will it prove absolutely curative, but it will tend to prevent the recurrence of the ulcer because of the diminution of the secretory portion of the gastric mucosa—and it may cure an incipient case of malignant disease. Many cases, it is true, will not demand this radical procedure, nor will it be possible to employ it in all, but in suitable cases it should prove most satisfactory, and its mortality in skilled hands should not greatly, if at all, exceed that of gastro-enterostomy. It seems to us that the questions now of paramount importance, in the consideration of this subject, are accurate diagnosis and the determination of the cases best suited for surgical interference. Because we believe that surgical technique has so greatly simplified that method of treatment, we must not conclude that every patient suffering from dyspepsia must be subjected to surgical interference. On the other hand we must urge that cases of ulcer, suspected carcinoma, or of stenosis must not be neglected until even surgery will prove of little avail for their relief. Ulcer of the stomach and duodenum must be considered as both a medical and surgical ailment, and the best results will be obtained when the physician and surgeon study the case in unison. Many cases of acute ulcer are relieved, at least temporarily, by proper medical supervision; some of them recur, either because the patient becomes careless and indifferent as soon as the symptoms subside or in spite of any care on his part. When such a recurrence is noted and response to medical treatment is not prompt, resort should be had to surgical advice. Again, when hemorrhages are occurring in acute ulcer very fre-

quently, or where they are profuse, operative means should be employed before the patient is bordering upon dissolution. Chronic ulcer, which has resisted proper medical treatment for a reasonable time, should be subjected to excision, or, if this is not feasible, gastro-enterostomy. In this kind of case the danger of malignancy is sufficient to demand excision—aside from all other reasons.

Where rupture of an ulcer is imminent, either in the acute or chronic type, *operate*. *Perforation* makes operation imperative at the earliest possible moment. The mortality increases directly in proportion to delay.

Dilatation, due to high situation of the pylorus causing food stasis, and pyloric obstruction from cicatricial contraction or bands of adhesion, are more satisfactorily treated by gastro-enterostomy than by either the Heinicke-Mikulicz or the Finney operation.

Gastroptosis, atony, and duodenal ulcer, when excision is not feasible, are indications for the performance of gastro-enterostomy. The indications for excision are chronic ulcer with induration, with hemorrhage, or where the danger of rupture is imminent.

In carcinoma and cicatricial hour-glass contraction from multiple ulcers, excision is employed when possible and gastro-enterostomy when excision cannot be performed safely. Even in extreme cases the palliative benefits of gastro-enterostomy justify this procedure.

Gastro-enterostomy has some disadvantages which must be considered when arriving at an opinion in a given case:

1. Vicious circle.
2. Vomiting.
3. Regurgitation.
4. Contraction of opening.
5. Jejunal ulcer.
6. Recurrence of ulcer and failure to cure or relieve symptoms, hemorrhage, etc.
7. Ileus.

The first four are practically negligible, as they occur but infrequently with our present methods.

The formation of jejunal ulcer may occur, although not frequently. It seems that the best way to prevent it is to place the opening nearer the cardia than was formerly done, and after the operation to give proper attention to diet, as for the treatment of the original ulcer. Very little can be done to make a cure certain or to prevent relapse beyond what the operation does in the way of drainage. The patient is placed in the best condition to be benefited by medical treatment, which should be continued.

The disadvantages of resection lie in its higher mortality, in the sacrifice of a considerable portion of the secretory function of the stomach, and in the fact that it will prove inapplicable to all cases. Its advantages are the removal of the probability of a recurrence and of the development of carcinoma, and the diminution of the acid secretion from the smaller-sized stomach which remains. The cure of a carcinoma is possible in exceptional cases, or, at least, an ulcer which is a potential carcinoma may be cured.

It is beyond the scope of this paper to enter into a description of the many operations offered to prevent the reflux of food, bile, and pancreatic fluid into the stomach, which are rather fully described by the late Dr. Fowler, in *Annals of Surgery*, 1902, vol. xxxvi. The number of methods and their intricacy would seem to show that the pioneers in this field considered this so-called vicious circle a real difficulty and an objection to the operation. It has been learned more recently that the best means of overcoming this difficulty is by the employment of a posterior gastro-enterostomy at the lowest point of the stomach and within a few inches of the point of emergence from the ligament of Treitz, without a loop. This is the simplest and best form of anastomosis, is least likely to be followed by ileus (a real danger in many methods), and accomplishes the desired result of doing away with the vicious circle. (Peterson, of Heidelberg, Mikulicz,

Moynihan, Czerny, Mayo, and Mayo-Robson have popularized the plan. (To properly appreciate the "no-loop" method see Mayo, *Annals of Surgery*, November, 1905.)

The incision of Moynihan seems to me to meet all the requirements, although the rectus muscle can be split instead of pushed to the patient's right. A 3½ or 4 inch incision is made about one-half inch to the right of the median line in the epigastric region, down to and through anterior sheath of rectus; this muscle is pushed to the right and the posterior layer of the sheath is cut directly behind the anterior incision. Upon opening the peritoneum a rapid but careful examination is made of the gall-bladder and passages, duodenum, pancreas, pylorus, and stomach. If the conditions justify completion of the operation, the colon and its omentum are lifted up and the jejunum brought into view. The transverse mesocolon is separated and the lowest point of the stomach drawn through the rent. In some cases this cannot be accomplished, a condition which was present in one of the cases reported herewith, where I completed the anastomosis by opening the greater omentum near the stomach, drew a loop of the intestine through the opening in the mesocolon, and both it and posterior wall of the stomach through the opening in the gastrocolic omentum. After completing the anastomosis, with clamps holding the structures meanwhile, the points of anastomosis were drawn back, the mesocolon sutured about it, and then the opening in the omentum was closed. This modification of the technique was necessitated by the presence of a cancerous infiltration which involved a large part of the lesser curvature and so much of the stomach walls as to force us far to the left to obtain a good point for anastomosis. The later history of the case shows the value of going far to the left, since when distended the low point lies farther to left. This patient had practically no trouble from regurgitation, although she had a hemorrhage from the cancerous ulcer. After the stomach wall has been brought through the opening in the mesocolon its posterior wall is caught in

clamps in an oblique direction (from below up and from right to left); the jejunum is made taut and clamped. Each organ should be placed in the clamps so that an incision from two to two and one-half inches can readily be made. Gauze pads are placed to protect the field. The two structures are then united by a chromic catgut suture embracing the peritoneum and muscularis by Cushing's or a continuous Lembert suture. We have found it well to place a knot at each end of this stitch to prevent any puckering of the opening. The stomach and intestinal walls are then incised for the desired distance; if thought advisable the redundant mucosa can be cut away after this is done. The posterior layers are sutured together, preferably with celluloid yarn, by a running stitch closely applied or by a buttonhole stitch. This suture should be inserted with a view to the prevention of hemorrhage from the cut edges, as well as to approximate the walls, and should be continued around the anterior edges so as to close the opening. The clamps are then removed and any hemorrhage checked. Then the serous surfaces are approximated by continuing the suturing with the catgut, which has been left long with the needle attached. When the first knot is reached the two ends are tied and the structures can be replaced in the abdomen, after making sure that the line of suturing is perfectly closed and the opening of sufficient size. Before doing this it is well to wash off the field of suture with a sponge wet with saline solution. The line of the anastomosis is attached to the mesocolon by suture to prevent the intestine being dragged into the opening in this structure and strangulated when the stomach is distended. The operation is best done with clamps, and in some cases can only be accomplished with their aid, while in others it can be readily done with a competent assistant holding the stomach and intestine in position. This operation is done in feeble individuals, and time is quite a factor, hence the operation should be performed with all the speed consistent with accurate approximation. After the anastomosis is com-

pleted the abdominal wall is closed in layers with catgut; one or two silkworm-gut sutures can be placed for safety if desired. Before leaving the consideration of the operation it is worth while to mention the mechanical aids to anastomosis, such as Murphy's button, Senn's plates, Robson's bobbin, McGraw's ligature, and Moynihan's clamps. The latter may be said to be the only one which is standing the test, and it certainly facilitates the operation. Of Murphy's button we have always been doubtful as to the propriety of the use of a body which may or may not be expelled, and which has in many cases caused sloughing, resulting in the death of the patient, and we can see no real indication for McGraw's ligature, for it saves nothing in operative time, does not enable us to feed the patient any sooner, is not by any means certain to cut through, and the resulting opening is no better than the one made by proper suture methods. The late Dr. Fowler speaking of it says: "I confess, however, to a feeling respecting the elastic ligature akin to that expressed by Codivilla, who, speaking of the use of the Murphy button in gastro-enterostomy, said: 'Its good function is always in God's hands.' "

The diagnosis of gastric ulcer and carcinoma is of special importance in the study of the surgery of this organ. The nearer we can arrive at a correct differentiation of the condition presenting in a given case, the better equipped are we to properly handle the case upon the operating table. We, therefore, urge upon the profession the necessity for the most careful study of every case presenting symptoms of persistent dyspepsia or indigestion. Many such cases find the seat of their distress in the gall-bladder region, and others in the morbid process in the stomach. Many of them can be relieved by proper medical or surgical means or a combination of the two, but linger, suffer, and finally die because the attendant does not go into the case carefully, but writes for a tonic or a digestive agent and dismisses the patient from his mind. The most important conditions which present in this con-

nection are: ulcer of the stomach and duodenum, carcinoma of the stomach, and gallstone disease. We will, therefore, only consider the diagnosis of these three conditions, since the entire subject would carry us beyond the scope of this article.

Ulcer occurs at any age, usually under forty, may be acute or chronic, and usually is painful. This pain is of gnawing or burning character over a small localized area, relieved sometimes by eating. It comes on soon after meals, the time of recurrence depending on the distance of the site of the ulcer from the cardia; if after three or four hours the ulcer is probably situated in the duodenum. The pain is relieved by vomiting, soon to recur, nearly always at the same spot. In addition to the painful point anteriorly, there is another in the back near the tenth or eleventh spine on the left side, to which attention has been called by Boas. Pressure over the stomach increases the pain and tenderness is elicited. The muscles of the abdomen make an effort to protect the stomach by contraction, hence rigidity is present in some cases. Change in posture may relieve the pain, as for instance, if the ulcer is on the anterior wall of the stomach relief is obtained by dorsal decubitus, while if the posterior wall is affected the prone position is assumed to obtain relief. The symptoms may disappear for some months under treatment, or from simple abstinence from food for a short time, to recur later.

The mistake has been made to consider hematomesis as necessary for diagnosis, since it occurs in macroscopic amount in a minority of the cases. Much stress is laid upon the detection of occult blood in the stools, especially by the German observers. Certainly hemorrhage from hemorrhoidal tumors must be excluded in order to make the observation accurate. This occult blood is present so frequently that Boas uses its absence as a guide in the determination of the certainty of a cure.

The secretion in ulcer is often increased in amount, is highly acid, and contains an increased amount of free hydro-

chloric acid. The motor power may be increased or diminished, and the dilatation with spasm of the pylorus may cause retention of the stomach contents for an abnormal period of time. If this condition is present evidence of it will be found in the stomach washings. Blood is at times found in the gastric contents, but not so frequently as in carcinoma. The value of gastric lavage as a diagnostic measure cannot be overestimated, yet a word of caution must be offered against its indiscriminate use, since in many cases the wall of the stomach is sufficiently attenuated to make the possibility of rupture a serious danger. In order to determine the location of an ulcer bismuth has been exhibited and a skiograph taken, but with only fair success. The use of the gastrodiaphane has the disadvantages of the stomach tube and yet may prove of value in some instances. In order to differentiate between ulcer and gallstone disease Murdoch has recommended the use of 15 grain doses of orthoform, claiming that it will relieve the pain of ulcer, but not of gallstone. Hemmeter and others concur in this opinion. In my hands orthoform has proved of value for its analgesic effect, but has not proved to be a very efficient diagnostic means.

Carcinoma presents usually a history of digestive troubles having been present for a long period, or, perhaps, gives the typical history of ulcer, with or without a period of relief from symptoms. In other instances it presents very suddenly with distressing symptoms referable to the stomach, such as pain, anorexia, epigastric distress, nausea, and vomiting, perhaps even vomiting of blood. While the duration of ulcer may be prolonged, that of malignant disease is never more than one or two years. Most cases of carcinoma occur after fifty years of age, making this a very valuable point in the diagnosis. Pain, if present, is usually persistent, accompanied by tenderness, is not so acute, nor so circumscribed, is neither so much increased by the ingestion of food nor so fully relieved by vomiting as is the pain of ulcer. Loss of flesh and strength is a well-known characteristic of carcinoma

in any locality, but more especially does it accompany that attacking the stomach. Any serious stomach disorder, however, will cause a loss of flesh and sometimes in ulcer it is quite rapid. Anemia is present in catarrhal gastritis, ulcer, and in cancer, and may be extreme in some forms of ulcer, especially the acute type, yet it never gives quite the same hue to the skin that malignancy imparts. In some cases of indurated ulcer it so closely resembles malignant cachexia that one should refrain from drawing conclusions upon the complexion alone.

Hemorrhage occurs less frequently in ulcer than in cancer, but is more often profuse and more likely to be intermittent. It may occur early when the general health is not greatly impaired, while hemorrhage from carcinoma occurs late and is persistent though slight in amount, yet may be profuse in some cases. Cancer progresses surely and steadily toward a fatal issue, while ulcer shows periods of improvement lasting often for some years.

Tumor is observed in a large percentage of cases of carcinoma if they are seen late, but if much benefit is to be obtained operation must be done before a tumor can be readily palpated. I do not mean to say, however, that every case where a palpable tumor is present is inoperable; on the contrary many cases of ulcer show sufficient induration, adhesion to surrounding structures, and even lymphatic enlargements, to be palpated through the abdominal wall, still do not present either the clinical or histological picture of malignancy.

Glandular enlargements are more likely to be noted in carcinoma than in ulcer, and this enlargement may be noted sometimes in the supraclavicular glands. A routine examination of this region is well worth while. Some cases of ulcer show well-marked lymphatic infiltration in the glands of the lesser curvature.

The size of the stomach is not of major importance in the diagnosis of these conditions, for we may find a dilated stom-

ach without ulcer or cancer present, or, again, we may find a normal capacity and these conditions present or absent, or, yet again, a contracted empty stomach may be found; in ulcer, because of spasm causing rapid emptying of the viscus —in cancer because of the infiltration of the walls and the discomfort on eating makes the patient refrain from taking anything into the stomach. Vomiting may occur in either, and in many other conditions. Usually the vomited material in ulcer is of large amount and very acid, containing free hydrochloric acid in excess, oftentimes even when fasting; while the vomitus in cases of malignant disease is found to contain sarcina, lactic acid, the Boas-Oppler bacillus, and at times fragments of the growth. The latter is rare, however. Again, while I deem the careful analysis of the stomach contents of great value in the diagnosis of these conditions, it is well to know that ulcer may occur without the hyperacidity and cancer even in the presence of free hydrochloric acid, yet this takes place with such rarity that if taken with the usual symptom-complex one need not censure himself if a mistake be made.

Examination of the blood is of some value, but it teaches us less perhaps here than any of the aids to diagnosis which are in use. It is of more worth as a basis for prognosis, or to determine for or against operation. Examination should be made for occult blood in the stools. The final means for diagnosis is an operative exposure of the stomach, when one can in most cases determine the condition, but in rare instances the microscopic examination is needed to confirm the opinion.

Some of the conditions with which ulcer and carcinoma of the stomach might be confused are: gastric catarrh, gastroptosis, atony, dilatation (a frequent occurrence in both conditions), gallstones, disease of the pancreas, malignant disease of the bile tracts, liver or pancreas, and ulcer of duodenum. It is beyond the scope of this essay to enter fully into the discussion of the diagnostic symptoms of these con-

ditions, yet it is worth while to consider the most frequent source of confusion—gallstone disease.

Gallstones usually cause trouble for years—attacks of colic accompanied by vomiting occur often in the night, following several days of overfeeding; relief of nausea often occurring as soon as the stomach is empty, the pain ceasing at same time. These attacks are frequently accompanied by fever and followed by tenderness over the gall-bladder region for some days. Jaundice may be present (one-third of cases), and the pain is usually greatest over the gall-bladder, radiating toward naval and up toward right shoulder.

The conditions referable to the stomach are in many cases not clearly determined until the time of operation, yet any case of troublesome interference with stomachic function, which has not responded to a well-applied medical treatment based upon a diagnosis made after careful inquiry with the aid of the known methods of precision, is one for exploration. Many of these unfortunate sufferers can obtain a cure, and even the incurable may obtain great relief, therefore, I would urge the profession to awaken from its position of ultra conservatism and give to these so-called dyspeptics the benefits that follow well-applied surgical means for their relief. As an evidence of what may be done for them, I am adding the reports of three cases which are illustrative of three distinct conditions that are met in this connection.

Case 1.—J. T. D., aged thirty-five years, laborer, native of Southern Indiana. Came to us from Dr. E. N. Flynn on October 4, 1905, presenting the following history:

Family history shows one maternal aunt to have died of cancer of the breast, and his sister is now under our care for carcinoma of the parotid gland. There is no history of tuberculosis in the family.

His present trouble dates back ten years, since which time he has had a chronic bronchitis, which has caused him less inconvenience during the last few years. Ten years ago he began to have stomach trouble, following a period of hard

drinking. The symptoms presented were abnormal appetite, gaseous distention, general malaise, constipation, and furred tongue. This condition continued with very little improvement, and five years ago he began to have vomiting after meals, appearing immediately after leaving the table. He complained of considerable pain and discomfort which was relieved for a few minutes after eating, but reappeared in a short time. He also stated that there was a sore spot about the size of a dollar over the stomach, which caused him much inconvenience, and now and then he has noted pain in the back. He has never vomited blood, but upon one occasion expectorated a small amount and once found some in the stomach washings. He washes out his stomach twice daily, and states that this is the only way in which he can obtain a fair degree of comfort.

Physical Examination. I found the abdomen rather flat and covered with minute pustules from croton oil, which he had been recommended to use as a counterirritant. The area of stomach resonance was about normal; slight resistance was felt near the pylorus, and tenderness was not marked.

On October 7, 1905, Dr. Lucas saw him and drew off twenty-four ounces of contents from the stomach two hours after breakfast. The distended stomach showed a marked increase in size, lower margin reaching below the level of the umbilicus; 125 c.c. of greenish fluid were removed from the fasting stomach, the total acidity of which was 46, and free hydrochloric acid 26.

Diagnosis of pyloric obstruction with dilatation of the stomach was made and he was subjected to operation October 17, 1905. On opening the abdomen the pylorus was found to be placed very high, the gall-bladder was normal and the stomach markedly dilated, but with the wall of normal thickness. No ulcer was discovered. A posterior gastro-enterostomy was done, silk being used for the outer row of stitches, and chromic gut for the mucous surfaces. The operation

was completed in twenty minutes, and the patient left the table with pulse of 60, which later dropped to 44, with a very full volume and quite regular. The pulse rate increased slowly, and on October 23 was 60 beats per minute. Considerable regurgitation occurred at first of blood-stained fluid, later of greenish mucus. Buttermilk was given him on the third day and broth on the fifth day after the operation. He regurgitated at least half the quantity of broth given, but none of the buttermilk. He was placed in the semi-sitting posture, which seemed to prove beneficial, and later he complained of regurgitation at intervals until he left the hospital on November 7, 1905. On November 10 he came to my office and showed considerable improvement, but has had trouble with gas and eructations at times since. His condition in August, 1907, is fine—complains of no pain, has no trouble at all and has abondoned the use of the stomach tube.

A most interesting feature in this case was the marked slowing of the pulse rate, which we have observed in other cases; appears to be due to a reflex sympathetic nerve action.

Case II.—J. E., white, aged fifty years; referred to me October 15, 1906, by Dr. Robert Wallace. His father died from a tumor in the chest which was diagnosticated cancer of esophagus. His mother died of softening of the brain; a young brother had two or three small tumors on his head, probably sebaceous.

Personal History. He has always been a great eater. Had scarlet fever when four years of age; light attack of typhoid fever sixteen years ago; thirty years ago he had a local sore with suppurative adenitis, but no secondary symptoms; has always been constipated. Years ago he drank whisky and beer pretty liberally, but for the last sixteen years has not been drinking any liquors.

Four or five years ago he had a watery, bloody stool which he thought due to piles. His present trouble began three and one-half years ago, at which time he was working in a tan-

nery wheeling bark. It began with a diarrhea, and a few days later, after drinking a cup of very hot coffee, he began to have pain and burning in the stomach like a red-hot poker. This pain was eased by taking baking soda. Subsequently the pain began from two to three hours after eating. It appeared more slowly when meat and solids were taken; earlier when fluids were taken. Water made the pain worse, causing a sour belching which did not follow the ingestion of beer. The ingestion of apples excited the pain. At first he had a feeling of weight in the stomach like a flatiron lying there. The pain was increased by walking about, but was present in almost every position of the body. It relieved the pain for an hour or more and for a longer time if he lay on his back. Lying on his abdomen sometimes eased it also, and the same was true at times of eating. The pain, which was of a gnawing or cutting character, seated above and to left of umbilicus, radiated to the left, sometimes downward and sometimes upward, and he also had some pain in the back. It was often easier in the morning. He noticed a rumbling of gas, and relief followed as soon as the gas passed a certain point. He often suffered from belching, sour eructations, slight nausea, but did not vomit and has had no further passages of blood by the stool. Stools are brown usually, now and then slate colored; on one occasion black. He has lost thirty pounds in the last year; now weighs 131 pounds.

Examination. Man of sallow complexion, thin but muscular, in only fair nourishment. He has a number of multiple lipomata over the body, mostly on the right arm; some over the abdomen. His abdomen is irregular, apparently from muscular development. By palpation the liver was found two and one-half inches below the normal position; by pressure on the right side of the abdomen a slight bulging appeared upon the left side. When the stomach was distended with air a palpable mass was found at the pyloric region. The lower border of the stomach was found two fingers' breadth below the umbilicus, and the upper border of the line of tympany

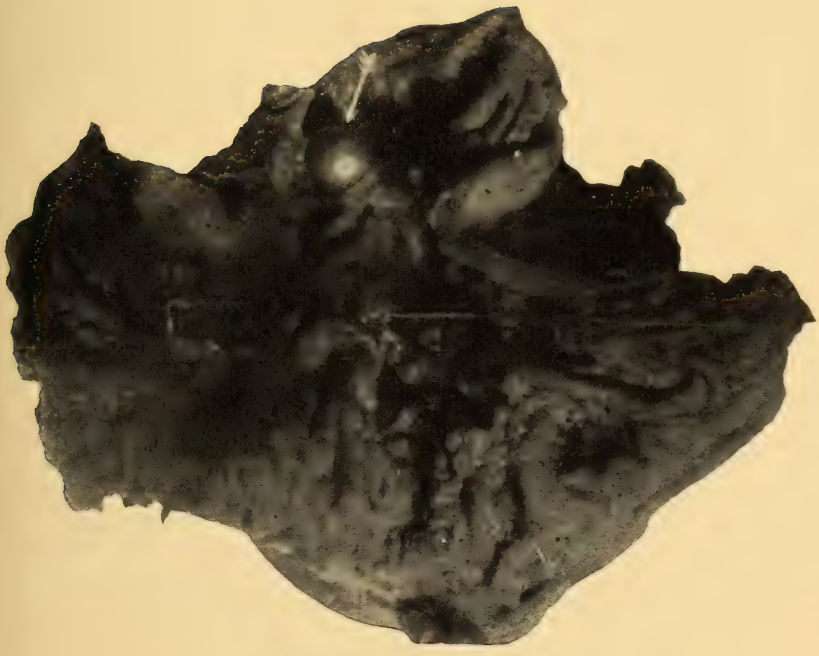

FIG. 1 —Shows section of the stomach removed in case No. 2 (J. E.) The light spot indicated by the arrow shows the site of the ulcer

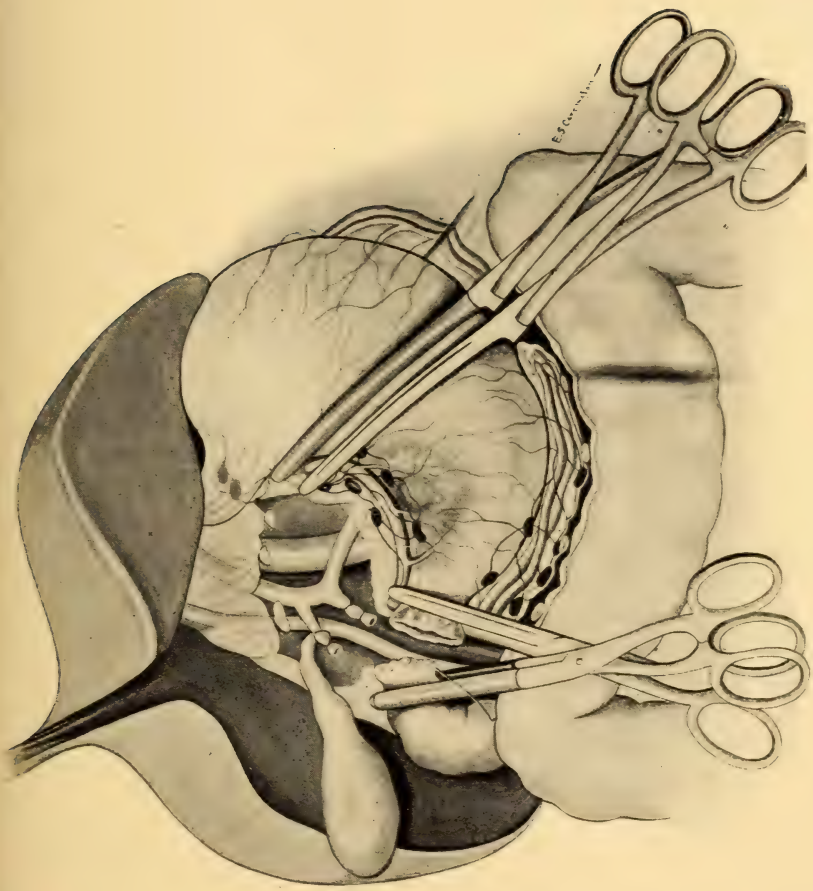

Fig. 2.—Represents the ulcer in situ with indurated area about it in process of removal.

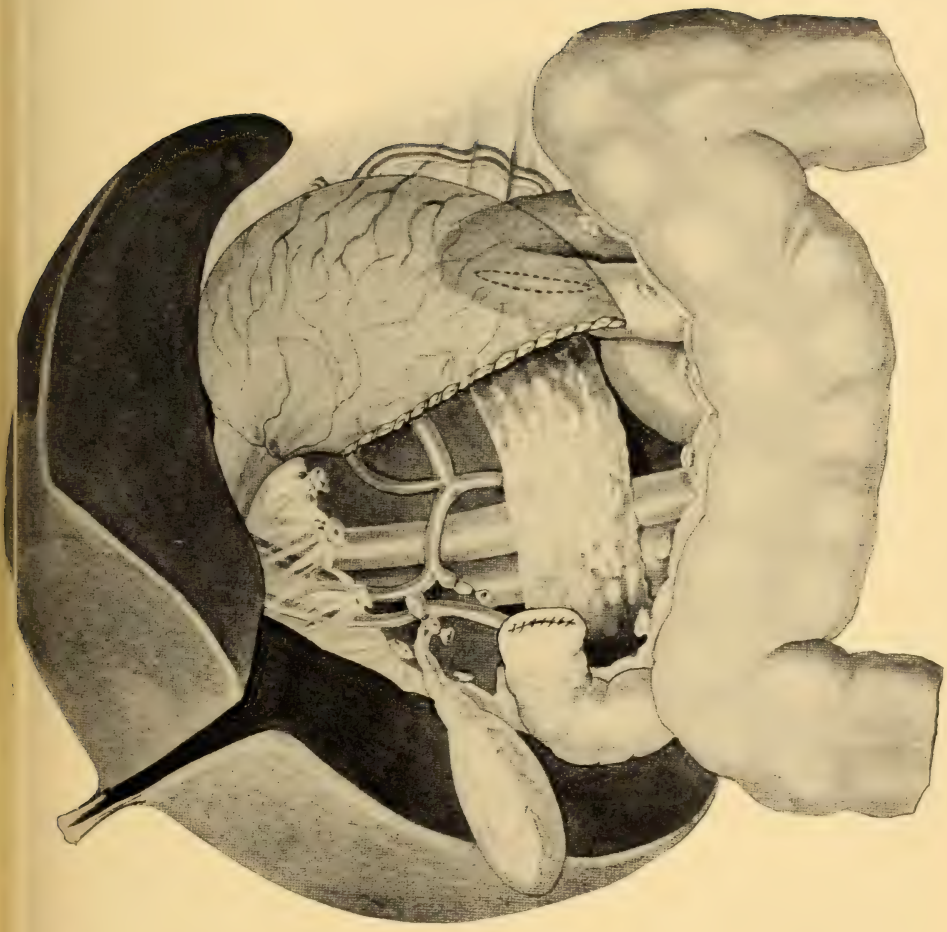

FIG. 3.—Represents the completed operation. The anastomosis was made without a loop, yet from the cut one might incorrectly infer that the anastomosis was made with a loop.

was but little lower than normal. Twelve ounces of very acid material was taken six hours after a light breakfast that showed a total acidity of 130, with a free hydrochloric acid value of 54. The following morning four ounces were removed from the fasting stomach, with a total acidity of 80, and with a free hydrochloric acid value of 32. Splashing sound was distinctly audible. No lactic acid; no Boas-Oppler bacilli. Urine 1020, no albumen, no sugar, no casts.

Diagnosis. Ulcer of the stomach with imperfect drainage. Operation was performed on October 24, 1906. Upon opening the abdomen the stomach wall was found thickened and indurated over an area of about three inches in diameter involving the anterior surface, a large portion of the lesser curvature and extending on to the posterior surface of the stomach. The glands in the gastrohepatic omentum were enlarged and readily palpable. The pylorus was not involved, but was spasmodically contracted.

The induration and the glandular enlargement taken in connection with the age of the patient, made the suspicion of carcinoma quite strong, and we decided to remove the mass; a resection of more than one-third of the stomach was made, the line of incision reaching as near toward the cardiac end of the stomach as was deemed feasible. The greater portion of the lesser curvature was removed and about four and one-half or five inches of the greater curvature, the second incision passing through the stomach near the pylorus. Both incisions were closed and a posterior gastrojejunostomy made with the stump of the stomach.

On the morning of October 25 his temperature was normal and pulse 82. Later his pulse dropped to 66 beats, and at 5 P.M. was 54. Had a slight amount of regurgitation of blood-stained fluid at intervals during the day.

On October 26, temperature 99°, pulse 48, full and strong, bloody fluid still being regurgitated in small quantity. The administration of ice and small doses of adrenalin chloride relieved it. In the afternoon of the 26th regurgitated fluid

contained no blood, but was slightly greenish in color. He received saline nutrient enemata (one pint) three times a day after the first twelve hours. Was placed in a sitting posture on the second day. He made a favorable convalescence and his pulse rate gradually increased to 60 beats per minute. On the fourth day he had liquid food and on the fifth he began to take solids. At intervals some regurgitation would occur, but this was very small in amount and finally ceased entirely. In the course of six or eight weeks he showed a prompt gain in flesh. Upon examination of the excised tissue a small, round ulcer was found in the centre of the indurated mass, just large enough to receive the tip of the index finger and fit snugly over the same. The edges were sharply cut and it resembled the shape of the inner surface of a hemisphere. The edges showed no tendency to granulation whatever, and were rather firm. The tissue about the ulcer was quite firm, the wall very much thickened, but without any nodulation.

The pathological report showed the condition to be ulcer with simple inflammatory thickening. The enlarged glands showed no evidence of malignancy, and were evidently the result of an inflammatory process.

The result in this case has been most gratifying, the patient at no time being in a dangerous condition, and has for many months been able to follow his daily occupation.

Case III.—Mrs. J. W., white, aged fifty-five years, was referred to me by Dr. Robert Wallace on October 23, 1907. The family history shows that no one in her family has ever suffered from any tumors, benign or malignant. About six years ago she had an attack of trouble with her stomach in which hematemesis was present a number of times in considerable amount. Following this for some time she was fairly comfortable, but during the past two years she has been growing steadily worse with pain in the epigastrium increased by food. This pain is dull, aching in character, felt most over the centre and left portion of the epigastrium, and also

to some extent posteriorly. It is accompanied with considerable tenderness on pressure.

She has also suffered from regurgitation of ingesta, the fluid being salty, rarely bitter, but never sour. Her appetite has been capricious and she has lost some flesh, although the amount is not marked, the patient never having been very fleshy. On one occasion several years ago she was jaundiced, but the jaundice soon disappeared. She has not been able to eat with any degree of comfort for some months; now everything, even water, taken into the stomach causes distress. Her complexion has a hue very suspicious of malignant disease.

Examination shows the epigastrium to be somewhat distended and full. The muscles over it are quite rigid. She is very tender on pressure. Her bowels are either constipated or loose; her stomach is small. Her urine is normal, although she had edema of the ankles some years ago.

Diagnosis. Ulcer of the stomach with contracture, probably beginning malignant change.

On October 26, 1907, gastro-enterostomy was done. A hard, nodular mass was found involving the lesser curvature of the stomach for three-fourths of its length and the central portion of the stomach, both anterior and posterior surfaces for several inches, and the left lobe of the liver which was closely bound by the growth to the stomach. The infiltration was so extensive that excision was impossible. We could with difficulty get far enough to the left to obtain sufficient stomach tissue to make an anastomosis. An opening was made in the mesocolon, but we were still unable to complete the anastomosis, and found it necessary to open through the gastrocolic omentum and to bring the posterior wall of the stomach and intestine through this opening to make the anastomosis. We used Moynihan's clamps, suturing the peritoneum with celluloid yarn and also a through-and-through suture through the coats of the intestine with the same. The patient left the table in good condition, pulse 112. Had a

very quiet convalescence up to the third day when she vomited, which the nurse thought to be the result of $\frac{1}{8}$ grain of morphine given during the previous night. She took water and egg albumen after twenty-four hours; then had panopeptone, tea, coffee, etc. She had no bad symptoms until November 1, when, after feeling splendidly in the morning, she suddenly felt faint and shortly vomited a pint of bright red blood. This, I think, was undoubtedly due to a disturbance of the ulcer from food distention and not to any suture defect. The usual remedies were exhibited to control the hemorrhage and no further bleeding occurred. The patient's recovery was prompt, and she had no further vomiting. Healing of the wound was complete on the eighth day. The amount of nourishment was increased, so that on November 13 she stated that she had taken more food and had remained more comfortable than she had for many months. She left the infirmary for home on November 13, 1907.

On November 18, 1907, she was in good condition except for edema of the legs, which threatened to become very serious. The urine failed to reveal, however, any evidence of Bright's disease, although we suspected this to be the cause of the condition. Since that time the edema has somewhat subsided. Her stomach condition is very much improved and the induration in the epigastrium is less; she has absolutely no tenderness and suffers no inconvenience after taking food.

SOME OF THE REASONS WHY CHOLECYSTECTOMY SHOULD NOT BE PERFORMED AS FREQUENTLY AS AT PRESENT ADVOCATED BY MANY SURGEONS.

By John B. Deaver, M.D.,
Philadelphia.

Before speaking of cholecystectomy it may be well to recall briefly the physiology of the gall-bladder, and the bearing that interference with its functions may have upon the subsequent condition of the patient.

The functions of the gall-bladder are in brief these: It acts as a reservoir for bile and as a tension bulb for the biliary passages, through the medium of which the vis-a-tergo of the bile stream is equalized. The force of the current of the bile stream is best illustrated by what occurs after the removal of a normal gall-bladder, when, unless the cystic duct has been tied very securely and with a ligature that will not be absorbed too quickly, the vis-a-tergo of the bile current demonstrates itself by the opening of the stump of the cystic duct, with resulting escape of bile. I have had this happen in my earlier experience before I appreciated the importance of this knowledge of the force of the back flow of the bile.

While I am aware that patients who have had their gall-bladders removed may remain perfectly well, this does not to my mind demonstrate that the gall-bladder does not serve a useful purpose; that the judicious surgeon—the surgeon who regards Nature and assists her as far as he can—will not ablate a gall-bladder which is still functionally active or

which may later become functionally active. The fact that a diverticulum from the stump of the cystic duct, or along the course of the common duct, occasionally develops after the removal of the gall-bladder, is sufficient proof to me that the gall-bladder was placed where it is for a useful purpose. On the other hand I have never seen this result follow ablation of a gall-bladder which had long ceased to functionate; evidently in such cases Nature has accommodated herself by slow degress to the absence of a reservoir for the bile.

The gall-bladder is more active as a reservoir during the longest interval between eating, which is during the night; and it is for this reason that people with normally functionating gall-bladders sleep better, other things being equal, than do those who are not so fortunate. I have sometimes thought that, perhaps, the reason that persons with gall-bladder affections sleep better after a late supper than would be expected of persons in their condition, is that the process of digestion keeps the gall-bladder more or less empty of bile, and that thus the presence of the lesser evil procures less disturbed sleep.

From the standpoint of subsequent pathology the gall-bladder is surely a most useful organ by way of which to drain in certain septic conditions of the liver and biliary passages. It must be admitted that drainage is the essential feature in all truly infectious diseases of the biliary passages; and as the use of the gall-bladder for this purpose, whenever possible, is safer for the ordinary surgeon than either of the deeper and more dangerous operations, namely, drainage of the common duct or of the hepaticus, the gall-bladder should be preserved whenever possible.

When chronic pancreatitis occurs after removal of the gall-bladder, prolonged drainage is indicated; and since, even if the common duct be obstructed, it is very exceptional to meet with such a degree of dilatation as will permit of a cholecdocho-enterostomy, the surgeon is hard put to it to maintain drainage for a sufficiently long time. If, however, the gall-

bladder has not been removed, a cholecysto-enterostomy will solve the problem, by giving not only a shorter convalescence but a more certain recovery, due to the permanent drainage.

In the absence of the gall-bladder, and in the presence of an hepatic emergency, the surgeon will be obliged to drain the common duct or the hepatic duct itself. Each of these procedures is an operation which may tax the skill of the expert abdominal surgeon; and if so, what must they be for those surgeons of limited experience in this line of work? The gall-bladder and cystic duct anatomically hold the same relation to the common duct that the cecum and its anterior longitudinal muscular band do to the appendix; therefore, the presence of the gall-bladder and the cystic duct is the white signal light to the surgeon who has to expose and drain the common duct in the absence of a foreign body—which latter will serve to locate the duct. For the above reasons, as well as those I will presently mention, we should feel keenly our responsibility when reaching a decision as to whether to do a cholecystectomy or a cholecystostomy.

When a gall-bladder is removed in the presence of infection of the bile passages, drainage should be established; when it is possible the stump of the cysticus should be drained; and if this cannot be done drainage of the hepaticus by means of the choledochus should be done, in all cases a rubber tube being introduced.

Some surgeons assert that after cholecystectomy sufficient drainage takes place by means of the choledochus into the duodenum, but it is much wiser to drain outside of the abdomen than to allow the infectious bile to flow into the duodenum, from which, as well as from the bowel further along, the toxic elements in the bile may be taken up by the tributaries of the portal vein, and the hepatic cells thus be exposed to the risk of re-infection. To me it is incomprehensible that surgeons should regard drainage of the hepatic duct through the common duct into the duodenum as sufficient in cases of cholangitis. To drain one infected

organ into another—the duodenum—I consider unsurgical in the extreme. In cases of severe pyelonephritis we are not satisfied with the drainage afforded through the ureter into a bladder which was probably the original seat of the disease; we perform nephrotomy and drain the kidney directly on to the loin. So when the liver is infected and we have a suppurative cholangitis, the only chance of safety lies in direct hepatic drainage through the laparotomy wound.

When in doubt I say drain, rather than remove a gall-bladder which may recover itself; better to do this even at the expense of a fistula (mucous), which will call for a second operation, than take out a gall-bladder which may again normally functionate. Better, I say, to do two operations in the attempt to save a gall-bladder that may recover itself, and in not a few of these instances save a human life at the same time, than to do an operation which will certainly sacrifice the one if not both.

That the mortality from drainage of the gall-bladder is less than that which attends its removal, we know. We must consider, moreover, the remote as well as the immediate mortality following cholecystectomy: this includes peritonitis from spreading infection, from hemorrhage which kills within two or three days, and the small bleeding responsible for a still later peritonitis—to say nothing of the additional shock to the patient by the latter operation, which entails more time and longer intraperitoneal manipulation—and these are very serious matters in many gall-bladder cases. This prolongation of the operation too often throws an additional burden upon already toxic kidneys as well as upon other emunctories, which they can ill afford. I have no hesitancy in proclaiming my partiality for the simpler of the two operations, notwithstanding the fact that my views are at variance with those of many operators, my individual experience has taught me the wisdom of taking this stand.

That the question of postoperative adhesions is a much more serious matter after cholecystectomy, I know from

repeated experience in operating for the relief of symptoms thus caused. It is only necessary to recall the anatomical relations of the viscera in the immediate neighborhood of the under surface of the liver, and our utter inability, in many instances, thoroughly to cover all of the exposed surfaces following the ablation of the gall-bladder, to arrive at a just appreciation of the crippling power of postoperative adhesions in this region.

Bland-Sutton, in a recent article on the "Discussion of the Indications for the Performance of Cholecystectomy," makes the assertion that "observations in the dead-house show that disease destroys it (the gall-bladder) very often without causing even inconvenience to the individual." This is a rather brave assertion, particularly when the dead cannot speak.

The occurrence of biliary colic is very rare after the removal of the stones and drainage. What is not very uncommon is colic the result of adhesions; this, if it occurs, calls for opening the abdomen and release of the adhesions. The recurrence of stone, as an objection to cholecystostomy, may practically be dismissed. The chief objection to cholecystostomy is the occurrence of fistula; with our present methods, however, this is much less frequent than formerly, when we attached the gall-bladder to the abdominal wall.

Fistulæ are of two kinds, mucus and biliary; the former is the result of obstruction of the cystic duct; in the latter the cystic duct is patulous, as a matter of course, otherwise we would not have a free flow of bile. The former I admit will require, in practically all instances, cholecystectomy; the latter not. I have been able to close most of these biliary fistulæ by freeing the fundus of the gall-bladder at the point of attachment, and turning in the margins of the opening and suturing; occasionally I have found it necessary to drain the gall-bladder (without attaching it anew to the abdominal wall); and in a few instances I have made a cholecystoduodenostomy. Rarely, if ever, has it been necessary to do a

cholecystectomy. The gall-bladder should not be removed unless we feel that by so doing we are taking away a menace to the future health and comfort of our patient.

Silk should never be used in the gall-bladder for repair or for the retention of a drainage tube; even chromicized catgut ligatures may act in the same way as silk, forming a subsequent nidus for gallstones.

In hydrops of the gall-bladder cholecystectomy is practically always required, since obliteration of the cystic duct renders the gall-bladder not only useless, but a continued menace from the liability of re-infection and even rupture. The only exception I would make to this rule is in obstruction of the cystic duct by stone if of recent standing; if the gall-bladder shows but little macroscopic evidence of disease, and upon dislodgement of the stone bile flows immediately into the gall-bladder, it may be wise to leave the gall-bladder.

Cholecystectomy should be done in cancer or other new-growths of the gall-bladder, where they are limited to the gall-bladder, and in calcareous degeneration, or in fibrosis of the gall-bladder.

Traumatism of the abdominal wall, with rupture of the gall-bladder, has occurred twice in my experience; in neither case was it necessary to do more than drain.

Chronic empyema calls for cholecystectomy, while in acute empyema drainage may suffice. Gangrene of the gall-bladder naturally requires its excision, and the same is true of perforation, since this last condition occurs most frequently when the gall-bladder walls are extensively diseased. In the presence of gangrene of the gall-bladder where there are severe constitutional symptoms, it may be wise to leave the gall-bladder temporarily; this has been done, and removal accomplished at a subsequent period, with good results. I have seen many an acute empyema recover following drainage only.

When the fundus of the gall-bladder only is diseased it should be resected, and the remaining part of the gall-bladder drained.

Ablation of a gall-bladder, the seat of stones, but otherwise healthy, is indicated when many small stones, all of which cannot be removed, are embedded in the mucous membrane. It will readily be understood that if even a single stone remains behind, we take chances on subsequent stone formation.

The only way of determining a patulous cystic duct, before opening the gall-bladder, is by palpating the duct for induration of its coats or wall (after division of the peritoneal covering), to see if it is kinked or pouched, and compressing of the gall-bladder, which, if the duct is open, should rapidly empty: the latter method is by far the more reliable. The gall-bladder should not be removed unless the cystic duct is permanently and irremediably occluded, and the walls seriously diseased. With few exceptions, when the duct is patulous, the gall-bladder should not be removed in acute catarrhal calculous or non-calculous cholecystitis; nor even always in acute suppurative calculous or non-calculous cholecystitis. In but comparatively few cases of chronic calculous or non-calculous cholecystitis is ablation indicated, unless hydrops, fibrosis, or calcification of the walls of the organ exist. I do not believe that the removal of the gall-bladder prevents absolutely the recurrence of stone, for we know that stones, though rarely, are found in the smaller hepatic ducts and in the common duct.

In gall-bladder work, as well as in other departments of surgery, hard and fast rules cannot always be followed. Whether the gall-bladder shall be taken out or not must sometimes be decided not alone by the condition of the organ itself, but also by the condition of the patient. While cholecystectomy may be proper when the gall-bladder is alone involved, it may not be proper in the presence of associated diseases of the bile ducts.

This question of cholecystectomy, pro and con, appeals to me strongly. From what I read and hear, I fear that removal of the gall-bladder is done too frequently, and I feel

that the influence of the prevalent teaching in favor of cholecystectomy upon those who have not had sufficiently large experience to decide for themselves for or against removal, will be bad indeed. Personally, I can honestly say that the more gall-bladder surgery I do the less inclined I am to remove the gall-bladder.

TRANSPERITONEAL URETEROTOMY FOR URETERAL CALCULUS.

By Gerry R. Holden, M.D.,
Jacksonville, Fla.

In approaching the ureter for the purpose of removing a ureteral calculus the extraperitoneal route is, for obvious reasons, almost invariably chosen. The transperitoneal route has at various times been strongly condemned as injudicious, dangerous, and unjustifiable.

While granting that the majority of cases can be easily and properly handled without opening the peritoneal cavity, it still seems that in some instances deliberate transperitoneal ureterotomy is the operation of election. I wish to give you as briefly as I can the main data of a case in point, together with the various reasons which would lead me to choose the transperitoneal route in occasional cases.

The patient, a woman, aged thirty-three years, was admitted to the gynecological ward of the Johns Hopkins Hospital (Gyn. No. 12130), in May, 1905. On account of the absence of Dr. Kelly she came under my care. She gave a history of recurring attacks of typical renal colic on the left side for nine years before admission. For five or six months before admission there had been no acute attack, and she finally came to the hospital seeking relief from a constant dull pain in the lower left quadrant of the abdomen.

After careful study we made the diagnosis of calculus impacted in the ureter just at the point where the ureter plunges under the broad ligament, with a stricture of the

ureter just below the stone. This diagnosis was based on the following observations:

On vaginal examination a slight thickening was felt high up on the left side. Cystoscopic examination showed that no urine came from the left ureteral orifice. A wax-tipped catheter passed into the left ureter met an obstruction about 2 cm. from the bladder. As no scratch marks were left on the wax the tip had evidently not been in contact with a stone. An *x*-ray picture showed the shadow of what was apparently a small ovoid calculus in the course of the left ureter, approximately about 4 cm. from the entrance of the ureter into the bladder.

We concluded that probably no infection had taken place in either the ureter or kidney because during two weeks' observation there was no local tenderness, no fever, and no acute attacks of pain; the leukocyte count was always normal, and the bladder urine was proved to be sterile.

Although skeptical of its feasibility we first attempted to remove the stone by the abdominal extraperitoneal route through a lateral incision. The woman was very fat, and after a few moments' work the impossibility of reaching the affected part of the ureter in this way became manifest. The lateral incision was therefore closed.

The patient was then placed in the Trendelenburg position, the abdomen opened in the median line, and the intestines pushed up out of the pelvis. The pelvic ureter on the left side was found to be dilated to about 2 cm. in diameter. A calculus was felt lying under the base of the broad ligament. The left tube and ovary were removed, the left round ligament cut in two, and by dissecting down through the broad ligament the lower portion of the ureter was exposed. The stone was found in the anticipated location. The uterine artery crossed over its lower third. Apparently the ureter was completely obstructed and the kidney thrown out of function.

After removing the calculus through a longitudinal incision,

an unsuccessful attempt to pass a ureteral catheter down into the bladder showed the existence of a very tight structure just below the site of the impaction.

Before incising the ureter the general cavity was so walled off and the field of operation was so surrounded by gauze that the discharge of a large amount of infected urine would not have contaminated the surrounding tissues. As a matter of fact, a very small amount of urine escaped after the removal of the stone and bacteriological examination proved this urine to be sterile.

The ureteral incision was closed with fine silk. Extraperitoneal drainage was made from the lower end of the abdominal incision to the wound in the ureter by dissecting the peritoneum away from the abdominal wall and then passing down a strip of gauze. Vaginal drainage was also made by bringing a strip of gauze out through a puncture in the lateral wall of the vagina. Both of these drains were made extraperitoneal by closing the cut peritoneal edges of the broad ligament and re-uniting the round ligament. The abdomen was then closed.

The postoperative course was uneventful. As soon as possible we began dilating the stricture with graduated ureteral catheters. It yielded readily to treatment, and six months after the operation we could still pass a large-sized ureteral catheter. The left kidney was then secreting normally.

In this case we chose the abdominal route because it enabled us to do clean-cut surgery, working always with the field of operation in full view, with plenty of room to get at it. Moreover, we were able to examine easily and thoroughly the entire pelvic ureter, and by the hand the rest of the ureter and the kidney.

Had the vaginal route been used the work would have been done in great part by touch, not under sight, exposure would have been difficult, and the working space contracted. Moreover, by the vaginal route satisfactory examination of the ureter and kidney above the stone, and of the stricture below, would have been impossible.

The site of the impaction here was higher up than we usually find in the cases of stones impacted in the lower portion of the ureter. The affected part of the ureter was not in contact with the vagina, nor was it near it. It was separated from the vagina by the lower part of the broad ligament, the large vaginal plexus of veins, and the vaginal branch of the uterine artery, while in intimate contact with it above lay the main trunk of the uterine artery with its several veins. We considered that the danger associated with blind work in this location was greater than the danger from laparotomy. The removal of the left tube and ovary was regarded as a justifiable means of thoroughly exposing the lower portion of the ureter.

The danger of peritoneal infection in laparotomy we considered slight. Apparently there was no infection of the ureter; certainly no vigorous infection. Any infection which could possibly be present could be easily taken care of by proper disposal of gauze during operation and extraperitoneal drainage at the close. This extraperitoneal drainage also precluded the possibility of postoperative intraperitoneal extravasation of urine from a leak at the incision in the ureter.

As I have already stated, an abdominal extraperitoneal operation was impossible on account of the thick abdominal walls.

I do not believe that transperitoneal ureterotomy for ureteral calculus is often the operation of election. I do believe, however, that it is the best operation when the stone is impacted at or just above the uterine artery, provided we are reasonably assured that infection is either mild or else absent altogether.

REPORT OF A CASE OF PYONEPHROSIS.

By J. A. Goggans, M.D.,
Alexander City, Ala.

Pyonephrosis is suppurative pyonephritis in a dilated kidney. This condition may develop from various pathological conditions. The conditions are microbic in origin. In the absence of local disease of the urethra, prostate gland, and bladder, the condition is brought about in an indirect way. The pathogenic bacteria may enter the kidney through the circulating blood current. Again, renal calculus is said to be the most common cause of suppurative inflammation of the kidney (Keys). This, of course, should be considered one of the predisposing causes, since the ureter is obstructed by the stone and pyonephrosis follows.

The history of the case I wish to report is by no means perfect and satisfactory, since during most of the time the disease was so insidious that no physician attended him. Male, aged forty-five years, family history good as to longevity. His mother, a sister, and brother suffered from glaucoma; had bad health for two years previous to his death. He had chills followed by fever and sweats at irregular intervals, which were regarded as of malarial origin and treated as such, but no impression was made by the treatment so far as recovery was concerned. In February, 1907, he had suppression of urine, which condition lasted forty-eight hours when spontaneous recovery occurred. His health for the succeeding month was about as it had been for the previous year. In March, 1907, he was again attacked with anuria,

which, like the preceding attack in February, spontaneously recovered. During all this time no examination of the urine was made. On July 17 he was again attacked with anuria. During this attack he was attended by Dr. Harlan who called the writer in consultation. No urine in the bladder, pulse 120 per minute, high arterial tension, respiration labored, and 28 per minute; temperature subnormal, edema of the face and lower extremities, distention of the abdomen, some nausea; patient inclined to be soporous. There was an increased area of cardiac dulness, attended with a basic murmur. There was pain in the right lumbar region. Swelling and dulness extended from the twelfth rib to the ilium, and from the spine in the lumbar region to a perpendicular line drawn within three inches of the median line of the abdomen.

The diagnosis of pyonephrosis of the right kidney was made. There was no evidence of disease of the left kidney other than it was not functionating. I thought that suppression of the action of the left kidney might be due to congestion caused by the burden of excretion being suddenly thrown upon it. At the same time the possibility of absence of the left kidney was discussed. This patient was septic and uremic, and such a condition demands at least nephrotomy. At the same time he had had two spontaneous recoveries from anuria of forty-eight hours' duration each.

Taking into consideration that spontaneous recovery may occur in calculus anuria in 20.8 per cent. (Morris) and in 28.5 per cent. (Legueu), and recovery even as late as the tenth day of anuria; also considering the fact that nephrotomy in a case of septic kidney is followed by a mortality of 30 per cent. upward, and that nephrotomy of calculus anuria gives a mortality of 50 per cent., caused me to give an unfavorable prognosis. To render the diagnosis more certain, I punctured the right kidney and removed eight ounces of pus. At this time, after the diagnosis was made certain by puncture, the family would not consent to the operation of nephrotomy.

I had to rely upon spontaneous recovery, and upon the possibility of the result of the removal of the eight ounces of pus from the right kidney, that the pressure removed by the operation might even dislodge a stone. Such a result failed to materialize, so the patient was allowed to go on with gradual increasing anuria and sepsis until the fourteenth day of anuria, when he died.

Autopsy was made twenty-four hours after death.

External Examination. Male, aged forty-five years, bony conformation, well formed; small quantity of adipose tissue; muscular development good; color pale; lower part of abdomen bluish; posterior part of body ecchymosed. Upon incising the veins through the skin, fluid blood escaped; odor slightly cadaveric. Rigor mortis decided; dulness on percussion on the right side from the twelfth rib to the crest of the ilium, and from the spine forward to a line drawn perpendicular from the nipple to the anterior superior spinous process of the ilium. Nothing abnormal about the external organs of generation. Abdomen much distended.

Internal Examination. Incision carried from the chin to the symphysis pubis; adipose tissue sightly developed; muscles of a bright color. Abdominal cavity: Diaphragm occupying high position in the thoracic cavity. Omentum very thin, not adherent; colon greatly distended with gas.

The small intestine was slightly distended with gas and fluids. Spleen lies deep in the left hypochondrium, and is of normal color and size. Liver normal in size. Anterior surface pinkish in color. Posterior surface dark in spots and extends to within three fingers' breadth of the crest of the ilium. No adhesions; ascending colon greatly distended and adherent to the anterior surface of the right kidney. Right kidney enlarged and adherent to the lumbar peritoneum. There were four ounces of blood in the right hypochondriac region underneath the kidney, and four ounces of blood in the bottom of the pelvic cavity. Ureter on right side enlarged;

dilated four or five inches below the kidney. Bladder contains four ounces of bloody fluid; ureter open at the bladder orifice; prostate of normal size. Size of the right kidney eight inches in length, six inches in width, and five inches in thickness. On incising the capsule pus escapes; pus pockets are found throughout the parenchyma of the kidney; the capsule was almost detached from the kidney by the abundance of pus. Left kidney absent.

Thoracic Cavity. Pericardium contains ten ounces of bloody fluid; heart enlarged and inflamed; left side of the heart empty; right ventricle contains fluid blood; left auricle contains an organized blood clot. Pleuritic adhesions extensive and firm on both the right and left sides. Color of the lungs blue-grayish. One of the interesting features of this case was the congenital failure of development of the left kidney. Congenital failure of one kidney is not so very rare (Schede). It was observed one time in 3370 autopsies (Morris); still it must be considered an anomaly of vast surgical importance, since the records show that in cases where one kidney is found to be absent, the kidney was found to be so diseased as to cause death (Schede).

The findings at the autopsy in this case illustrate a surgical principle of further importance, viz., that in cases of anuria or other conditions in which the surgeon does the operation of nephrotomy, with the possibility of finishing the operation by doing a nephrectomy, and he finds that the kidney under consideration is much enlarged, that he had better not proceed with the operation until he is sure that the opposite kidney is present and active, or capable of functionating.

The following report on the pathology of this case, made by the New Orleans Clinical Laboratory, explains itself:

"Specimen shows infiltration with lymphoid cells which form nodular masses containing epithelioid and giant cells —tuberculosis."—O. L. Pathier, M.D., Pathologist.

A CASE OF SARCOMA OF THE RECTUM.

By James E. Thompson, M.B.,
Texas.

The literature relating to sarcoma of the rectum is so limited and so unsatisfactory, that I felt an obligation to report fully the following case which came under my care recently.

F. S. S., male, white, aged forty-nine years, came under my care on February 26, 1907.

Occupation. Farmer.

Habits. Good.

Family History. Of no consequence, except that his mother died of tuberculosis.

Previous Diseases. Has suffered from malaria. No history or evidence of syphilis. Has never had dysentery.

Present Trouble. In October, 1906, he noticed a slight flow of blood from the bowels, and thought it was due to piles. Since this time he has been troubled with alternating states of diarrhea and constipation. In November he noticed a sense of fulness in the rectum, associated with pain and difficulty in defecation. In December the bowels became more and more obstructed, and he complained from time to time of colicky pains over the colon.

Constipation became still more troublesome, and larger doses of salts were required to empty the lower bowel.

Since that time, up to his admission to the Sealy Hospital, under my care, the symptoms have gradually increased in severity, and occasionally mucus and considerable quantities

of blood have been passed. In spite of this the patient has not lost very much flesh, but feels moderately strong.

A few weeks before coming under my care he had been examined by another surgeon, who refused to operate. A portion of growth had been removed for a pathological examination. The pathologist's report was a round-celled sarcoma.

My first examination, which was conducted with the finger, without an anesthetic, discovered a very large fungating growth, reaching down the rectal wall as far as the upper edge of the internal sphincter, and apparently extending all around the rectum. It was very friable and bled freely. The lumen of the bowel was obstructed by the growth, and although the forefinger could be thrust along the lumen, the upper limit of the growth could not be reached. Also, it appeared that the growth had infiltrated the posterior wall of the rectum and had contracted adhesions to the front of the sacrum. Apparently the base of the bladder was not implicated.

The inguinal glands were not enlarged. There was no enlargement of the liver.

I suggested an examination under a general anesthetic, and procured permission to perform an inguinal colotomy and remove the rectum at the same sitting if I thought it advisable.

On February 27 a left inguinal colotomy was performed. A gridiron incision was made very low down and through it the pelvis was carefully examined.

The upper limit of the growth could be felt at the lower part of the pelvis. Absolutely no enlargement of the lymph glands could be detected. The sigmoid flexure was then fixed to the parietes as in Maydl's procedure. Care was taken to bring out a loop of the upper part of the sigmoid, so as not to hamper the separation of the rectum from below at the subsequent operation. Examination of the growth was then made more carefully from the anus and a piece

removed for microscopic examination. The upper limit of the tumor was beyond reach of the examining finger, and its relations to surrounding structures were found to be exactly as described above.

The colotomy opening was made on the third day with the thermocautery, but only one-third of the circumference of the gut divided, because I wished to reëstablish the intestinal canal at a subsequent date if possible.

On March 20 the patient was ready for the final operation. This was the "Kraske" in nearly every respect, except that the incision through the soft parts followed the line suggested by Rehn. All the coccyx and both sides of the sacrum up to the third sacral foramina were removed.

The rectum was easily loosened behind and laterally, and the peritoneal cavity opened in the early stages of the operation, on each side of the bowel, fully two inches above the upper limit of the tumor. Gauze sponges were packed into the pelvic cavity, and a strand of gauze was looped around the rectum and used as a tractor to facilitate its separation from the base of the bladder. It was found necessary to remove both sphincter muscles and the anal margin.

The rectum was divided about one and one-half inches above the growth, care being taken not to spill the contents. Before division a ligature was passed around each branch of the superior hemorrhoidal artery. No lymphatic glands were observed in the mesorectum. The peritoneal cavity was closed up as carefully as possible, and the lower end of the bowel carefully sutured to the upper angle of the lateral incision.

Unfortunately the greater part of the perineal wound had to be packed with gauze to check the persistent oozing of blood.

The shock of the operation was profound.

Convalescence was very tedious and was complicated by complete retention of urine, necessitating constant catheterism. Even now, at the present date (December, 1907),

the patient writes to inform me that he has still no power to expel urine. Otherwise his health is excellent and there is no sign of recurrence.

Pathological Report (James J. Terill). Description of an alveolated round-celled sarcoma of the rectum.

Gross Appearance. The growth appears in the wall of the rectum, and measures 9 x 12 cm., being 2 cm. thick in its thickest part. It is soft, grayish-red, and fleshy, and the surface projecting into the lumen of the intestine has an irregular, lobulated appearance with very little free exudate upon it. At the margins, which are fairly sharply defined, the growth is covered by a line of the intestinal mucosa. At no place has the tumor grown entirely through the wall. At the margin, where the section was taken, the muscular coat is seen still underlying the tumor. There is very little evidence of necrosis even in the central part of the mass.

Microscopic Description; the Stroma. The sections are given an alveolated appearance by an interlacing network of delicate, well-formed fibrous tissue fibrils, in places showing a number of large definite spindle-shaped nuclei of fibroblasts. This fibrous stroma is more marked toward the periphery of the growth, and, as one goes to the centre of the tumor, the stroma is so diminished that it is represented only by a delicate fibril here and there. At no place does the stroma have definite connections with the essential cells of the tumor.

The Parenchyma. The tumor cells proper are generally rounded in shape, although many of them have been made polygonal or even blunt spindles or ovals by pressure. In the stained section they vary in size from 4 to 14 mikrons in diameter, most of them being from 6 to 8 mikrons across. The nuclei are comparatively large, and in the majority of the cells they occupy the greater part of the cell space. In the densely cellular areas the cytoplasm is represented by a thin rim only, so that at first sight we seem to have many free nuclei. The nuclei show an excess of chromatin (hyper-

chromatosis) and various stages of mitoses. These latter, however, rarely follow the normal mitotic figures. Some of the cells have small, densely staining nuclei (pyknosis). It is not unusual to find cells with more than one nucleus. There has been considerable karyorrhexis, as shown in the cells by a multitude of small chromatin granules and by free chromatin lying in between the cells. Where the cytoplasm is sufficient to be studied it is seen to be granular, its edges frayed, with an occasional protoplasmic process. All through the section there is a delicate granular intercellular substance.

The Blood Supply. In places the tumor has surrounded preëxisting bloodvessels, which show good walls, except for some degeneration. The fibrous stroma mentioned above carries capillaries of large caliber, but provided with an endothelial wall only; and, occasionally, blood spaces are seen which depend upon the cells of the tumor for their walls.

Degenerations. Degenerations of the individual cells are seen throughout, and on the free surface only the fibrous fibrils with some granular debris, leukocytes, and a few red blood cells are left.

Position of the Tumor in the Rectal Wall. In the section taken from the margin the growth is definitely in the submucosa, the mucosa, with its muscularis mucosa and gland tubules, extending over its free surface, while at its base the tumor is enclosed by the muscular coat of the rectum, which is well developed here.

Diagnosis. Alveolar small round-cell sarcoma of rectum.

Excluding melanotic sarcomata, which are much more frequently met with than the non-pigmented growths, I have been able to find references to two cases in addition to the four collected by Hartmann and Quénu in 1899. One is described by Key and the other by Massabuan.

Key's case is as follows: It was a very vascular round-celled sarcoma. There had been a previous history of hemorrhoidal troubles and severe bleeding. A year before the operation the patient had noticed a plug about one inch

long, the size of the little finger, protruding from the anus. This increased in size. Then came pain and difficulty in urination. The tumor was excised, but soon recurred, and the patient committed suicide.

Massabuan's case was one of sarcomatous polyp of the rectum.

I think Quénu and Hartmann are unjust in refusing to accept Case I, reported by Ball in his monograph. Although the clinical history of the case is absent, there is no doubt, from the description of the gross specimen and the pathological appearances, that it is a case of spindle-celled sarcoma. It is figured on p. 319, and the description is as follows:

There is projecting from the anus an enormous mass which measures 5 x 4 inches. It is much lobulated on the surface, presenting somewhat the appearance of an ordinary papilloma of this region. It differs, however, in this, that the individual lobules are much larger and the intervening depressions much shallower. A small group of secondary growths appear near the scrotum, in the skin of the thigh, and the disease extends up into the rectum for a distance of about two inches. There does not appear, however, to have been any obstruction, as the tube was quite pervious behind the growth. There is, unfortunately, no reliable history with this specimen. Dr. P. S. Abraham, the late curator of the museum, kindly undertook a detailed examination, and he made microscopic sections from the mass inside the rectum, from the external growth, and from the secondary formations. In all of them the appearances were practically identical; there was no trace of proliferating mucous membrane; almost the entire mass of the sections consisting of small spindle cells, with but little fully developed connective tissue.

Concerning Ball's second case, the objection is probably justly taken, as Fig. 48, p. 320, looks like a massive syphilitic infiltration of the rectal wall, while the pathological description is of the most meagre kind.

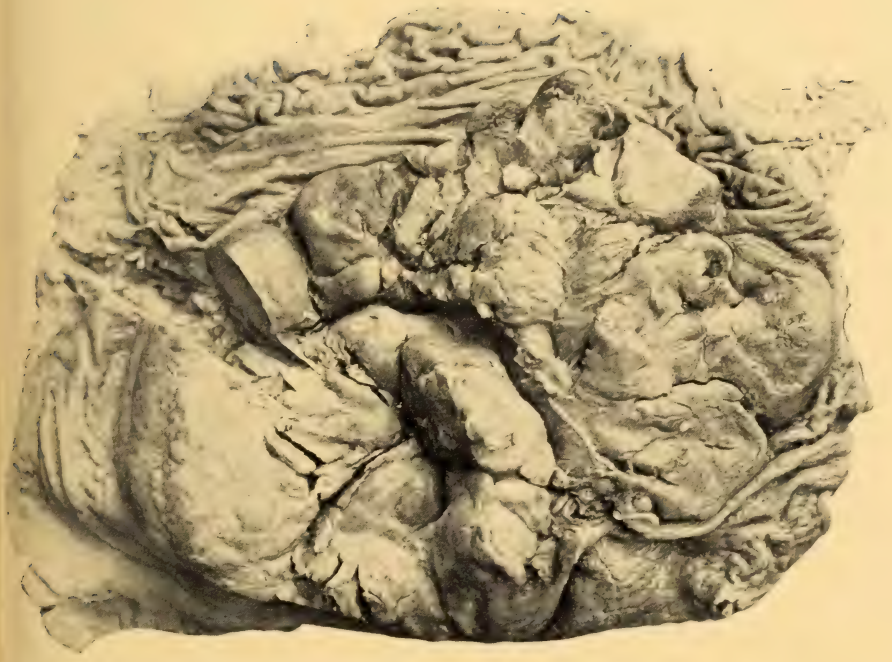

Fig. 1.—Alveolar sarcoma of rectum.

Fig. 2

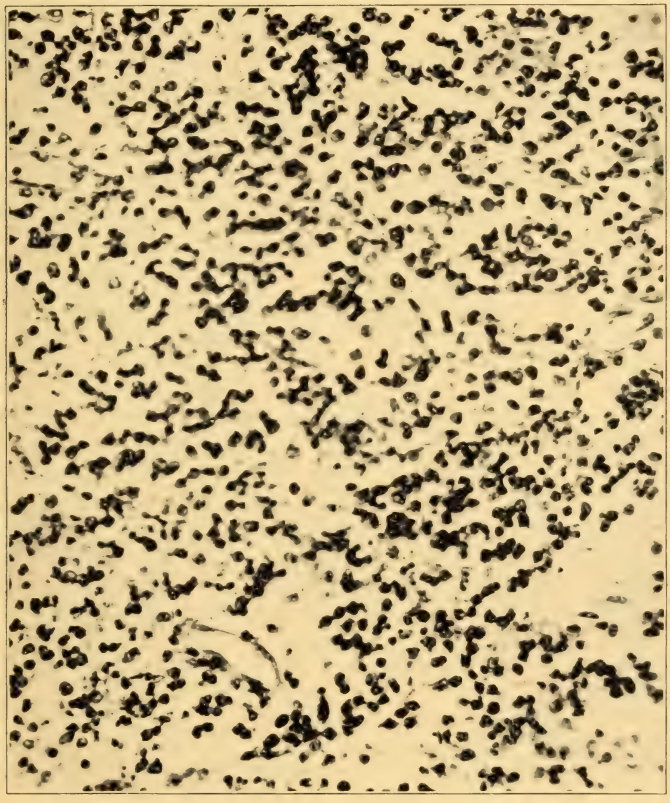

Fig. 3

Quénu and Hartmann attempted to construct the symptoms of the disease from four cases, but the time is not yet ripe.

Apart from the pure pathological interest, the symptomatology differs so little from that of carcinoma as to be indistinguishable; nor, at the present stage, is it of such great practical importance to be able to establish a close differential diagnosis, because the same methods of treatment are advisable in both diseases. The only point of difference seems to be in the matter of glandular infection. There seems to be an absence of glandular infection in the non-melanotic varieties. If this fact is established in subsequent cases, the necessity for the combined abdominal and perineal operations may not exist, as there will be no necessity to remove all the tissue in the mesorectum.

The physical characteristics of the sarcomata described seem to differ widely; so widely, in fact, that no conclusions can be drawn as to the growth being sarcomatous, because it is soft or fungating, or because it is diffuse and extensive.

The following list of cases, with references, will be self-explanatory:

Reporter.	*Reference.*	*Character of Tumor.*
Wagstaffe.	Trans. Path. Soc., Lond., 1869, t. xx, p. 176.	Ossifying sarcoma.
Esmarch.	Pitha. und Billroth, Handbuch, 1882, Band iii, S. 183.	Alveolar sarcoma.
Trédenat.	Montpellier Med., 1885.	Round and giant-celled sarcoma.
Grenet.	Thèse de Paris, 1887, No. 231, de la sarcomatose rectale.	Fibrosarcoma (spindle-celled).
Ball.	Rectum and Anus, Case I, p. 319.	Spindle-celled sarcoma.
Key.	Nordiskt. Med. Arkiv., xxxviii, Surg. No. 2. Drei Fälle von Rectalsarkom (Case III).	Round-celled sarcoma
Massabuan.	Montpellier Med., 1907, xxiv, 389–401.	Sarcomatous polyp.

I append here Key's list of cases of non-melanotic growths. Some of these references I have been able to verify; others I was unable to procure. I have found some serious inaccuracies. Thus, he mentions two cases of lymphosarcoma described by Hessert and Bevan, whereas Hessert alone mentioned a case with no description attached.

In the case mentioned by Duplay and Reclus, the description is so meagre that nothing can be made out of it.

Carwardine's case is simply mentioned, and no authentic description attached. In the same connection, A. E. Barker mentioned a case and still another is referred to in his practice.

Key gives the following classification:

Five spindle-celled sarcomas (Bardenheuer, Kraske, Muscatello, Carwardine).

Two round-celled sarcomas (Brackmann, Key, Case III).

One alveolar (Esmarch).

One fibrosarcoma (Grenet).

Two lymphosarcomas (Hessert, Bevan).

Two giant-celled sarcomas (Verebély, Trédenat).

One myeloid (Duplay and Reclus).

BIBLIOGRAPHY.

Bardenheuer. Ein Fibrosarkom des Mastdarmes. Diss. Muenchen, 1902.

Brackmann. Zur Kasuistik der Sarkome des Rectums. Diss. Erlangen, 1903.

Carwardine. Spindle-celled Sarcoma of Rectum. British Medical Journal, London, 1893, vol. ii, pp. 1555, 1, 811.

Duplay et Réclus. Traité de Chirurgie.

Esmarch. Erkrankung des Mastdarmes. Deutsche Chirurgie von Billroth und Luecke, 1887, H. xlviii, p. 195.

Grenet. De la sarcomatose rectale. Thèse, Paris, 1887.

Hessert. Ann. Surg., 1902, vol. xxxvi, p. 459.

Kraske. Die primären Bindegewebsgeschwülste des Magendarmkanals. Diss. Berlin, 1894.

Muscatello. Del sarcoma e del melanosarcoma primitivo del recto-Reviewed in Centralbl. f. Chir., 1902, p. 1102.

Trédenat. Montpellier Med., 1885.

Verebély. Magyae. owsi arch., 1904, pp. 308, 380. Reviewed in Ztschr. f. Krebsforschung, 1905, vol. iii, Heft 1, p. 171.

PERINEPHRITIC ABSCESS FOLLOWING PARTURITION, WITH REPORT OF THREE CASES.

By J. Shelton Horsley, M.D.,
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The etiological relation of puerperal sepsis to perinephritic abscess has long been known, but the occurrence in my practice of three cases due to this cause within two years, and the fact that the symptoms and course of the disease in each instance were quite similar, made me think them of sufficient interest to report.

Case I.—Mrs. G., aged thirty-two years, white, was referred to me and admitted to the hospital October 27, 1904. Family history was of no significance, except that her mother had had consumption. There was no other history of tuberculosis, and no history of cancer. The patient's health was very good until four months before she came under my charge, when she had been delivered of a healthy baby. The confinement was uneventful, and her recovery apparently satisfactory. She had borne three children previously, and there was no history of sepsis or difficult labor in any of these births. About six weeks after her last confinement she began to complain of pain in her right hip, radiating down the thigh. It was severe and continuous, and interfered with walking. After this her back and right side became painful, and she noted a mass in the right flank which was quite tender. At the time of admission to the hospital the patient was much emaciated and slightly cachectic. The mass was easily palpated, was hard, immovable, and somewhat nodular.

It occupied the right flank, extending down almost to the region of the appendix. The right thigh and leg were flexed. Urinary examination showed no pus or albumin in the urine. Her temperature on the first two days after admission varied between 100° and 102°; pulse from 120 to 134. On October 31 a point of fluctuation appeared just beneath the skin over the right lumbar region and was opened under cocaine, considerable pus being evacuated. The patient was in a critical condition, and nothing else could be done at this time. After building her up as much as possible she was operated upon under ether on November 17, when a long incision was made in the loin, and a quantity of pus found. From this time on the patient improved rapidly, and was discharged on December 12 with practically normal temperature, and pulse running between 70 and 90.

Case II.—Mrs. F., aged thirty-five years, white, admitted June 20, 1905. Family history of no significance. Patient had borne several children, the last one three months before she came under my care. There was no mechanical difficulty about this labor, which seems to have been followed, however, by a mild degree of sepsis. Pain in the right hip appeared a few days after confinement. The general health of the patient began to fail; there was fever, loss of appetite, and marked constipation. The patient was quite fat, even when admitted. Swelling could not be detected by inspection, but a fixed mass in the right flank could be readily made out by palpation. It was hard and regular in outline. Her temperature during the first few days varied from 100° to 102.5°; pulse from 88 to 100. Urinary examination showed a few pus cells with much granular debris, otherwise the urine was normal. Consent for an operation would not be granted until June 22 when an incision was made in the right lumbar region under ether, and a quantity of pus evacuated. A large tube and two strips of gauze were inserted for drainage. The patient's temperature declined gradually, but did not run constantly normal until July 14, after which time it never rose above

99°. On August 1 she was discharged with the wound in good condition, and very little secretion from the sinus. Her temperature was normal and pulse 82.

CASE III.—Mrs. T., aged twenty-four years, white, admitted to the hospital March 17, 1906. Previous history of no significance, except that she had always been rather delicate. Three months before admission she was confined, this being her first pregnancy, and was in labor about eighteen hours. She was attended by a midwife who sent for a physician just before the child was born. No instruments were used, and, except a slight tear in the perineum which the doctor sewed up, the confinement was uncomplicated. About four or five weeks after delivery the patient, who had been apparently well until this time, began to suffer from pains along the middle of the crest of the right ilium. This gradually grew worse, and in a few days some swelling in the right flank was noticed. Pain was constant and boring in character, but never sharp. She had lost much weight. Constipation was marked, and appetite poor. On admission to the hospital a large fluctuating tumor could be made out on the right side above the crest of the ilium. The patient was in bad physical condition, her pulse running from 116 to 128 and of poor quality, with temperature about 101°, so she was operated upon under cocaine immediately after admission. More than a pint of pus was evacuated. She began to improve at once, her temperature never going above 99.5° after the second day. On April 12, 1906, she was discharged, her temperature running normal and pulse from 80 to 88. There was a sinus present, but the rest of the wound had healed, and the drainage was very slight.

These three patients were referred from the country districts. Two had been attended in confinement by a midwife, the physician being called only when perinephritis had set in. One case, Mrs. F., gives a history of slight puerperal infection. In the other two instances there was no particular difficulty in delivery, and recovery appears to have been uncomplicated

by sepsis. One of these patients was up and feeling well a week after delivery, and in both this case and in that of Mrs. G. there was a distinct interval of apparently perfect health between the delivery and the first symptoms of perinephritis. In all three instances a vaginal examination, made when I first saw the patients, showed no evidence of inflammation in or about the uterus, tubes, or ovaries. It is most probable that sepsis had been introduced during parturition or during convalescence, and the germs were carried by the lymphatics to the tissues around the kidney just as tuberculous glands in the neck are infected by germs brought by the lymphatics from an abrasion in the mouth or throat. The muscular exertion during confinement probably produced some slight injury to the tissues around the kidney, and in this way lowered their resistance to bacteria.

An interesting fact about these cases is that all three abscesses were on the right side. This is difficult to explain satisfactorily. The only explanation that I can offer is that the right kidney and perinephritic tissues are somewhat lower than the similar organ and tissues on the left side; consequently, the right perinephritic tissue is more liable to injury from the pressure of the uterus during the muscular exertion incident to parturition. The left kidney, which is higher up, somewhat escapes the bearing-down pressure of the pregnant womb.

The fatty capsule of the kidney is surrounded by a special layer of fascia, called "renal fascia," which separates the fatty capsule from the true retroperitoneal tissue. This fascia is defective below, at the lower pole of the kidney, allowing the fat in the fatty capsule to become continuous with the retroperitoneal fat at this point. The vessels of the fatty capsule anastomose freely with the venous plexus around the ureter. Stahr (v. Bergmann's *Surgery*, vol. v, p. 334) published a paper in 1899, showing that the kidney and its fatty capsule, contrary to the generally accepted opinion, possess systems of abundant lymphatic capillaries. These

lymphatics in the fatty capsule necessarily communicate freely with the retroperitoneal lymphatics at the lower pole of the kidney where the renal fascia, which encloses the rest of the fatty capsule, is defective. It is not difficult to understand, then, how bacteria taken up by the puerperal uterus may be carried by the lymph vessels through this defect in the renal fascia and deposited in the fatty capsule where a point of least resistance has already been made by the trauma of recent parturition.

The symptoms and diagnosis of perinephritic abscess are exceedingly important, because the symptoms are often vague and difficult of interpretation in the early stages of this disease, and because the successful termination of these cases, as shown by statistics of Henry Morris, Küster, Bowditch, Rosenberger, and others, depends largely upon the promptness with which the disease is recognized and operation undertaken. Gibney has pointed out the symptoms by which the early stages of perinephritis may be recognized even before pus has formed. When, after an injury or violent muscular exercise, as in parturition, there is tenderness on pressure over the kidney, and the patient on sitting or standing inclines to the tender side, the possibility of perinephritis is at once suggested. According to Gibney, in the early stages of this disease the spine is unnaturally stiff and curved in an anteroposterior direction. The curvature is not angular, and there may be some deviation from the affected side. There is stiffness in walking, and the body is inclined to the inflamed side to such an extent that sometimes the ribs and the crest of the ilium are in contact. When the patient sits she is likely to rest upon the opposite tuberosity of the ischium with the body bent to the affected side and the thigh and the leg somewhat flexed. While standing, the body will be bent upon the thigh of the affected side. If an attempt is made to stand erect the body is thrown over toward the tender side, and the opposite thigh and leg are flexed. It is difficult to stoop. When the patient lies on her back it is impossible to

extend the thigh. In severe cases every movement of the trunk is painful. Flexion of the thigh gives no pain, but an attempt at complete extension will be impossible and will cause much discomfort. Abduction and adduction are usually not interferred with to any marked extent. When pain in the knee is complained of, together with lameness and muscular rigidity, the diagnosis is often confounded with hip-joint disease. In perinephritis there is no atrophy of the muscles of the thigh, the leg on the affected side is not shortened, and there is no swelling or tenderness on pressure about the trochanter or neck of the femur. Passive motions of the hip-joint cause no pain.

The temperature in perinephritis, even in the early stages, frequently reaches 103° or higher. As the disease progresses, other symptoms are marked. The continued high temperature, with sweating, coated tongue, loss of appetite, nausea, and other constitutional indications of sepsis make their appearance. Constipation is always a prominent symptom, and is partly due to the patient's dread of pain on muscular effort. In chronic cases, or those progressing slowly, the elevation of temperature may be slight. In weakly individuals the symptoms are often quite atypical, and may be masked until the abscess forces itself upon the attention of the surgeon by its increase in size. Even in these cases, however, lameness is present at an early stage.

Pain on pressure is an early and continuous symptom; the pain is often deep-seated and paroxysmal, though, as a rule, it is present to some extent constantly. The distribution of the pain is usually wide, this being due to the irritation of the nerves of the lumbar plexus, which is in immediate proximity to the perinephritic abscess. In two of my cases pain in the hip was a prominent symptom; in the other it was referred along the iliac crest. Pain may be referred to the knee-joint as in hip-joint disease, or to the external genitals as in kidney colic, or around the abdomen as in the case of appendicitis. Pain is always increased on pressure

over the loins. As the disease develops, fulness in the outline of the tender flank is noticed. Some muscular spasm also appears. The swelling in the region of the kidney is at first hard. In one of my cases it was somewhat nodular from excessive exudate and very closely simulated a malignant tumor. The fulness in the flank can be observed in outline by comparing the two sides under a good light. Sometimes pressure of the mass on the iliac veins causes swelling of the foot and ankle. If the pus is not evacuated at this stage it frequently burrows to the surface and the skin becomes edematous and waxy in appearance, and later may become red. The abscess, however, may burrow into the pelvis below or upward into the lung or pleura, or it may rupture anteriorly into the bowel or peritoneal cavity. Fluctuation is not often detected, even in the late stages.

The urine in cases of perinephritic abscess following parturition is not affected unless the abscess ruptures into the kidney, which is rare. The character of the pus may be quite different in different cases; frequently the odor is of a fecal character without any direct communication with the bowel.

The treatment of these cases consists in evacuating and draining the pus by a lumbar incision similar to that employed in the operation of nephrotomy. This should be done as soon as the diagnosis is made, as the mortality of this affection is greatly increased by delay in operating.

THE SENSITIVE AND SHORT UTEROSACRAL LIGAMENT: ITS CLINICAL SIGNIFICANCE AND TREATMENT.

By Edward J. Ill, M.D.,
Newark, N. J.

The writer is well aware that what he has to say to you is nothing new, and has been said better before this. So far as he knows, however, but two writers have been preëminent in discussing this condition as an entity. They are Schultze,[1] of Jena, and Burrage,[2] of Boston. My first paper appeared in 1895, another in 1903.

It seems to me that it is important to recognize the condition, for many an ovary and appendix have been sacrificed under a false apprehension.

Let it be clearly and definitely understood that these changes in the position of the uterus are due to a pathological condition of the uterosacral ligament, not to extraperitoneal, tubal, or ovarian disease. The malpositions produced by such extraperitoneal disease are peculiar in themselves, can be made out clinically, and differentiated from the condition described in this paper. A shortening of the base of the broad ligament, the frequent result of puerperal injuries, and scars resulting from cellular inflammation should not be mistaken for the short, sensitive, uterosacral ligament.

[1] Ueber die Lage veränderung der Sebärmutter B. S. Schultz Samlung Klinisher Vorträge, 1873, and Die Pathologie und Therapie der Lageveran odevuog der Gebärmutti, 1881.

[2] American Gynecological and Obstetrical Journal, 1898–1900

It seems to the writer that any organ in the pelvis which is painfully sensitive to moderate pressure is diseased. Outside of an acute pelvic exudate, he knows of no condition so painful as the short and sensitive uterosacral ligament. While the condition resulting from the disease, namely, the displaced uterus, is more apparent, this extremely sensitive point should not be overlooked. Burrage tells us that 10 per cent. of his private cases suffered thus. The writer's own experience is that 14 per cent. of his office cases have lateral and retroposition of the uterus, from one of the many causes. Among 3558 operative gynecological cases, 199 suffered with short, sensitive, uterosacral ligaments or over 5 per cent. The left uterosacral ligament was noted as being shortened in 73 per cent. of the cases where but one ligament was diseased. Its proximity to the rectum has been thought of as an etiological factor.

The writer believes that the condition will become more apparent when we consider the cases of disease of one ligament only. The result invariably will be to draw the uterus backward, upward, and to the side of the short ligament. If, now, any attempt is made to draw the uterus into a position opposite the short ligament violent pain will be the result, while if the uterus is pushed toward the short ligament, no complaint will be made. A fixation of the uterus thus results from this condition. The circulation of the organ becomes impaired, catarrhal and metritic changes accompanied by menstrual disturbances result, and the patients tell us that they are gradually going from bad to worse.

Now and then we will find a case where the impaired mobility, due to a short urterosacral ligament, will be devoid of symptoms until some specific injury or truama results in sensitiveness. Often enough the etiology is difficult to understand; at other times it is quite apparent. Some cases are surely acquired during childhood or are congenital, for in these symptoms are produced with the onset of puberty. Some cases are most distinctly and surely produced during

the active sexual life. One can easily trace many a case to a fall from a hammock, a misstep, a severe attack of piles, or constipation.

The symptomatology is quite definite, the physical examination constant in its results, and the treatment simple and effective in the majority of cases.

In that excellent book published by Kelly and Noble (p. 302), while speaking of the diseases of the pelvic cellular tissue, we are told that "it should be remembered that the pelvic connective tissue varies normally in different individuals, and that the rectum and uterosacral folds in many women are sensitive to pressure through the vaginal vault. The conclusion, therefore, that an actual lesion of the cellular tissue is present, because the uterosacral ligaments feel thicker than normal, or are tender on pressure, is not justifiable."

The writer wishes to combat this assertion by long years of clinical experience. Since the poor victims of this painful trouble never die from the disease, the writer is not able to give you any pathological or microscopic findings. Those who are able to make autopsies in the young and unmarried might study these ligaments and give us the result of their findings. It would form an extensive task and a paper too long for the present object to go over the whole discussion of posterior parametritic changes. Let it be sufficient to say that short, sensitive, uterosacral ligaments, in the writer's experience, form an important and many times a curable condition.

The symptoms are not varied. With the patient in whom one ligament only is diseased and who has acquired the disease during childhood, or in whom it may be congenital, the symptoms invariably begin with the menstrual epoch. The patient will tell us that the symptoms are of increasing severity. There is pain in one or the other iliac region, frequently on the side of the longer ligament. These patients tire easily, get nervous, and their general health suffers much

for the want of exercise. The menstrual pain, which is bearable in the beginning, later becomes very excessive and longer in duration. In the long-continued cases, sensitive spines and a painful coccyx are added to the symptoms, while occipital headaches are frequent. When both ligaments are diseased we have those symptoms so well known to you all, of the pathological anteflexed and fixed uterus.

In the acquired case, where but one ligament is short and sensitive, the pain is commonly referred to the sacro-iliac synchondrosis or the iliac region of that short side. Menstrual pain seems to be common to all, and is probably produced by metritic and endometritic changes.

Neurasthenic cases are common, and where so the prognosis is usually bad. Sterility is a frequent symptom, and is probably due to endometritic changes. Thus among the married cases operated on during the last three years, 80 per cent. were sterile. Abortion is not infrequent as a result. The objective symptoms are simple and apparent. When both ligaments are shortened the uterus is elevated by 1 or 2 cm. The organ is close to the sacrum and its mobility much impaired so far as the cervix is concerned. The corpus may be found in retroposition as well as the cervix, or may be strongly antiflexed or even antiflexed and retroverted.

When one ligament only is short, thick, and sensitive, the uterus is elevated and displaced to the side of that ligament and retroposed. The short ligament stands strongly out as soon as the cervix is drawn downward and forward, even to a very moderate degree, and expressions of great pains are made known by the patient.

In making the diagnosis one must first remember the normal position and mobility of the uterus. When we find the uterus outside of this normal position, and its mobility impaired by a short and sensitive ligament, the diagnosis cannot be difficult. We thus have a retroposition when both uterosacral ligaments are short, a lateral position when one broad ligament is short, and a retrolateral position when one

uterosacral ligament or one uterosacral and one broad ligament of the same side are short. The condition has been mistaken for retrodisplaced uteri, as evinced by the many cases seen by the writer when the Adams-Alexander or the suspension operations were attempted. The prognosis is bad for those who come from a neurotic family or who have been going on for years, since the resulting pathological changes in the uterus are incurable.

Semi-invalidism is a common result. Operation and treatment offer good and satisfactory results in many cases. Pregnancy or repeated pregnancies offer an excellent chance for cure. Dr. Burrage advises section of the uterosacral ligament after a celiotomy and suspension of the uterus.

The operation the writer suggests is a most thorough stretching of the tense, sensitive uterosacral ligament, with the patient under profound ether anesthesia.

This is not always an easy matter, and much patience and muscular energy must be expended to reach the desired result. The uterus should become freely movable, and the cervix dragged forward until it nearly touches the pubes. The technique is this: The patient is placed in the lithotomy position, and one or two fingers of the right hand inserted into the vagina, and placed behind the cervix as a prop for the outer hand. The fingers of the left, or outer hand, now gradually insinuate themselves behind the uterus, and by a rotatory movement the ligament is thoroughly massaged between the two hands. While this is being done the uterus is also dragged forward until it nearly reaches the pubes. The fingers of the right hand should be kept quiet, and no boring or any other motion allowed except a lifting forward of the uterus. The uterus is now dilated with steel sounds to a No. 36 French, curetted, irrigated, and a glass plug No. 32 French, measuring 5 cm. in length, is introduced. The posterior vaginal vault is packed with a five-yard strip of iodoform gauze. The plug acts as a fulcrum for the gauze, and thus keeps the ligament on a stretch. At the same time

that it keeps the plug in place it makes pressure in the posterior vault of the vagina. After three days the packing is removed and replaced by another, if the glass plug has not been forced out of the uterus. In three more days all is removed and the patient kept in bed for a week.

She is then told to use douches of hot water, while in the knee-chest position, for two months. The result of this treatment has, in the main, been satisfactory. Failures have occurred, and repeated stretching has been done in a few cases.

The writer has never seen any harm result from this operation, and begs for a renewed study of this interesting and frequent condition.

TRAUMATIC EPILEPSY.

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We have no subject in medicine today more perplexing to both the neurologist and the surgeon, than lesions of the central nervous system. The diagnostic symptoms distinguishing the operable from the inoperable cases are not always clear, as the etiology of the disease is still a mystery. That many cases are traumatic we do know, and I believe that a large percentage of unrecognized cases are of traumatic origin. It is not my purpose to enter into the subject of diagnosis and treatment, but rather to suggest what I believe would prevent the occurrence of many cases. It is not unreasonable to look upon any case of traumatic injury of the skull, of sufficient violence to cause temporary unconsciousness, as the origin of the future development of epilepsy. This question at once admits of argument, and, naturally, suggests immediate surgical interference. To interfere in all cases would be a serious error, but I do believe that if we could keep a record of all head injuries that the percentage of cases of traumatic epilepsy would be greatly increased, and diagnosis made clear in many of the perplexing instances brought to our notice. What I do want to emphasize is the importance of carefully examining all head injuries, especially wounds of the scalp, at the time of the occurrence. It is true that in many instances little or, possibly, nothing will be detected, but it is equally true that many fractures are overlooked. The wound should be thoroughly cleaned, and if the nature

of the injury is believed to be serious enough to cause a fracture the wound in the scalp should he enlarged and the bone thoroughly exposed to ascertain the presence or absence of fracture; and, whereas, it does not follow that the presence of a fracture will result in epilepsy, a depressed fracture is likely to and should be operated on at once. It may be argued that the absence of fracture does not insure immunity against epilepsy. Very true, but if all fractures are operated upon I believe many cases will be saved from this terrible affliction. It was believed, until Kocher advanced his theory in 1889, that epilepsy was due to adhesions or cicatrices in the cortex. Kocher, however, believed that these played an insignificant role. He believed epilepsy the result of the intracranial pressure, and, suggested, as the relief of this condition, the establishing of a permanent opening. There are two objections to Kocher's method: (1) The exposure of an unprotected area of brain surface which is more or less a constant menace to the comfort of the patient, but not so serious as might be supposed; and, (2) the possibility of the return of symptoms due to contraction of scar tissue. This objection seems to have been overcome in many cases by the introducing of a plate of silver or celluloid. If the old theory is correct this method is, in my opinion, best; but if, as Kocher believed, the attacks are due to intracranial pressure, then closure of cranial defects with osteoplastic flaps has the advantage, insuring better protection to the brain. Time will only permit me to generalize upon these methods, and until the etiology of epilepsy is better known we can judge by the results of treatment only, and this after the lapse of many years. The following cases in my practice will serve to emphasize some of the different phases of the question and the importance to be attached to blows on the head:

Case I.—The first case was that of a boy, aged eight years, who, while walking along the street, was struck in the forehead with a piece of shell or brick thrown by another boy. The wound inflicted was just over the superciliary ridge on

the right side, was about one-half inch in length and exposed the periosteum. The wound seemed slight; was thoroughly cleansed and dressed. In a few days was closed and apparently well. About ten days after receipt of the injury the patient developed rather peculiar symptoms. He became very irritable, boisterous, and unmanageable, showing signs of great mental disturbance. No convulsions occurred so far as I could learn. However, the symptoms pointing toward some irritation of the frontal lobe, I determined to open the wound and explore the bone. I found a depressed fragment about three-fourths of an inch in length and one-half inch in width. The bone was comminuted and depressed possibly one-eighth of an inch. A few of the smaller pieces were removed with a small chisel; the other fragments lifted, revealing the dura, which was apparently intact. The wound closed and dressed. The symptoms subsided at once and the boy made an uneventful recovery. With my present experience I should always explore a wound of this kind most carefully, and determine whether there was a fracture with or without depression. Any fracture is liable to produce Jacksonian epilepsy; a depressed fracture is almost certain to do so.

Case II.—Mr. L., a gentleman, aged fifty-two years, was swinging in a hammock attached to two posts fastened in the ground. One of these being decayed gave way and struck him across the head, inflicting a gash about three inches in length, extending over the entire parietal eminence on the left side. The wound, which was ugly, was examined at the time, but no signs of fracture were visible. At the time of the injury this man was a prosperous farmer, a man of intelligence and thoroughly able to conduct his business. When he was brought to me twelve years later he was in a state almost bordering on stupor, dull of comprehension, scarcely cognizant of his surroundings, and unable to transact business. For several years past he had been having attacks of petit mal. These attacks were growing more frequent all the time and his intellect duller. With the history before me I felt that I

was dealing with a case of Jacksonian epilepsy. Dr. Van Wart saw the case with me, and though the history was vague, agreed, from what he could gather as to the nature of the attacks and the muscular twitchings on the right side, that this was a case in which surgical interference would prove beneficial. Accordingly, in August, 1906, I did an osteoplastic resection, lifting a flap covering the left parietal eminence and extending almost to the sagittal suture. On lifting this I found adhesions to the dura and quite a free hemorrhage followed. A portion of the osseous flap, about three-fourths of an inch in width and two inches or more in length, was removed. The bone was replaced and the flap sutured. This patient made an uneventful recovery, and had but one attack after the operation. His improvement was gradual but marked, the condition of his mind cleared up to such an extent that he was able to transact his business, and continued so until about ten months after the operation when he had another attack, and for the two months following had probably a half dozen attacks of petit mal. I cautioned him at the time of operation that I had not done exactly the operation I should like to have performed, and that there was a possibility that the flap would adhere to the dura, and that he might have a return of some of his old symptoms. Accordingly he returned to me in April, 1907, and, as I was at the time suffering from an infected hand, Dr. Parham very kindly removed the old scar tissue, enlarged the opening and covered the intervening space with celluloid. His recovery from the second operation was also uneventful, and he has had but one attack since returning home. In this case, of course, it is impossible to judge of the results, but so much was he benefited by the first operation that he voluntarily submitted to the second, and my hope is that as many cases in which celluloid has been used seem to have been cured that he, too, may obtain permanent relief.

Case III.—The third case is one with most unusual symptoms and the history is interesting.

O. M., aged eight years, was brought to me suffering fro n epileptic attacks occurring as often as three or four times a day. The child's mind was completely unbalanced. He was extremely nervous. While awake was constantly moving about; would repeat the same word or sentence continuously; had a wild desire to run toward moving objects, and would spend hours at a time clipping bits of paper. He was absolutely unmanageable, without a particle of judgment or reason, and had to be guarded constantly day and night. The condition was most peculiar. I had seen or read of nothing just like it. The following history of his earlier life, gathered from his mother, is interesting as bearing upon his condition:

She writes: "It was about the age of four that he received a lick on his head. Little was thought of it at the time as it was apparently only a flesh wound. We were not with him when the accident occurred and do not know whether he was knocked senseless or not, but he complained very little of it and was apparently well in a few days. We saw no change in his condition for a year or more, when I noticed the first paroxysm. It lasted only a second, after which he seemed a little stupid. I grew alarmed as this occurred more frequently day by day, and we consulted our physician who seemed to think there was no occasion for alarm. He believed the trouble probably due to worms or some intestinal derangement. This relieved our anxiety for a while, until I noticed the attacks grew more frequent and gradually a little more severe. We noticed also that he was hard to control and did not improve in some things as he should. I remembered the blow he had received on the head, which was caused by a bull-tongue ploughshare, which fell from the loft in the barn, a distance of some feet, and struck him upon the head. I felt uneasy about him, believing this might have had something to do with his present condition. We then put him under the care of a physician and relative, to whom we spoke of the wound in the head, but he was not able to detect any

trouble as a result of this. After watching him carefully he adviesd us to take him to a specialist on nervous diseases. We consulted Dr. Bremer, of St. Louis, who gave us absolutely no encouragement, pronouncing it a case of epilepsy and incurable. We told him of the lick he had received on the head, but he attached no importance to this. His opinion, of course, was a great disappointment to us; in fact, worse than death, but we were not satisfied. All this time he was growing worse. We kept him quiet with bromide, when it required at least twelve tablets a day to stop the paroxysms, and he was still restless, never still a minute except when asleep. He grew very little, if any, for two years, but when we moved to Clarksville two years ago he began to grow and his trouble grew rapidly worse. The paroxysms had always occurred during the day only, but as he grew worse they took on an entirely different form, occurring also at night and very severe. Some nights he would have three or four, then may be miss four or five nights before having any more. During the day he was perfectly wild and altogether unmanageable. His disposition, which was naturally very sweet, unselfish, and affectionate, had grown spiteful and cruel, and it was dangerous to leave him with the smaller children. He seemed to have no judgment as how to play with other children. If we crossed him in any way he grew wild and tried to hurt us, in fact he was like an insane person. But such a thing as reasoning with him or punishing him was impossible. All we could do was to hold him until he got over his fit of passion or his attention was diverted to something else. We dared not take him anywhere except to drive, but we finally had to stop this as he wanted everything he saw, such as sign boards, bits of paper, etc. We advised with nearly every physician in town, and they were all inclined to attribute the trouble to the lick on the head. This was encouraging to us to know that it was not real epilepsy and there was a chance for his recovery. We knew that if something was not done for him immediately we would have to send him away from

home, so we took their advice and sent him to you. This is his history, as near as I can write, before the operation."

On March 23, 1903, Dr. Sam Corley, of Clarksville, Texas, brought the little patient to me, and finding the condition as stated above I asked Dr. P. E. Archinard to see the case with me and decide whether, in his opinion, the child would be benefited by operation. After a careful examination we concluded to keep him under observation for several days, and were fortunate enough to see him in one of the attacks and discovered that it was a case of Jacksonian epilepsy. The convulsive movements began in the right side of the face, hands, and arms, and then continuing to the lower extremity of the right side before the attack became general. There was marked motor aphasia. Another noticeable symptom observed by Dr. Archinard, was marked weakness of the muscles of the right side. With this history before us the doctor decided that we were perfectly justified in doing an exploratory craniotomy.

The operation was performed on the morning of March 27, 1903. The scar resulting from the injury was located just below the parietal eminence on the left side, and on a line perpendicular to the meatus of the ear. I made a semilunar flap exposing the cranial bones under this scar, where we found a line evidently the result of an old fracture. I trephined with a small antrum trephine, and af er removing five buttons of bone, enlarged the area with a De Bilvis bone cutter, making an opening fully two and one-half inches in length and nearly one and one-half inches in width. There were no adhesions to the dura, and examination of the membranes and through them the cortex did not warrant further exploration. The skin flap was replaced and held in position with interrupted sutures. The child was sent back to his room, and, with the exception of one paroxysm the night of his operation, his recovery was uneventful. The improvement seemed to be almost immediate.

On December 8, 1903, his mother writes: "Since the

operation he has had two paroxysms, one while in the Sanitarium, and one the first night after he arrived home. Since then he has not even been threatened with one that we have ever seen. We still give him bromide every day. He goes to Sunday-school every Sunday and says the golden text as well as any of the children; also stands up and sings for dear life. Then when he comes home he tells me all about his lessons and what songs they sang. We have taken him to church several times and his behavior was perfect. He plays all day with the smaller children and has never had any of those wild tantrums since he came home, but he has bad days and good days. Some days he is not any more care than the other children, then, again, when he feels bad he is real cross and irritable. Of course he is by no means well, but those most horrible paroxysms have stopped and there is such a wonderful improvement that we feel very thankful for this, though he still gets excited when he talks, and since the operation he has not been so healthy and robust, more subject to colds, and has had one or two little attacks of malaria, with some other trifling derangements that are scarcely worth mentioning."

Every few months I have received news of the little fellow which has been most encouraging, and several months ago I received a letter written by himself. I have also learned, through Dr. Corley, that the child's condition is almost normal and his improvement has been, in his opinion, marvellous. He tells me that only a short time ago he heard him recite a piece of poetry in public, and it was done as well as any child of his age could do.

On May 4, 1907, I received the following letter from his father: "I am sorry that I have not been able to take Ona to New Orleans, but hope to make the trip some time this year. My children had the measles in March, and just as they were getting through with the measles they contracted whooping-cough. All are just now getting over that, and Ona has complained quite a lot of his head; said it hurt him

where he was operated on. He complains mostly after a hard coughing spell. He might have had headache, nevertheless we thought we would tell you about it. We were talking about New Orleans a few days ago and asked him about Miss Miller, and he wanted to write to her at once; so I am enclosing you his letter, which you will please forward." The letter is quite long, well written, and the spelling is good, and would be just such a letter as you would expect of a child of less mature years.

In reporting this case I feel that his condition having escaped the notice of a specialist, who believed that it was absolutely hopeless, that similar cases may exist, and wherever there is doubt an operation would be justifiable as there is little danger attending it. The case has certainly been remarkable from every standpoint.

LEVERAGE IN SPINAL DISEASE.

By J. D. Bloom, M.D.,
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The value of this mechanical idea, that the venture of modern-day orthopedic privileges, is startling in its conception to a pathological thought, but within the limits of care and a physiological wisdom very satisfactory in remedia effect.

In this I desire to recount the frequent and very salutary benefit obtained by an improved method of treating vertebral body disease, which demands leverage for a positive benefit.

It is known in the pathology of this condition that whilst a single vertebra may be the primary seat of disease, more frequently two or more are involved. Additionally has it been shown that the disease is primarily osseous and not periosteal, and rarely involves the transverse or spinal processes.

The focus of this disease is usually multiple in the single vertebra, and the anterior part of the vertebral body more frequently and most actively involved.

Dr. E. D. Fenner, in a published article, mentioned the supine position used by me, and pictured the apparatus for obtaining the leverage and fixation in this position.

Whilst perfect ease has frequently followed the mere rest use of this apparatus, the pinnacle pressure that is maintained upon the gibbus for a perfect result so excites a general ana-

tomical spinal effort of balance that only quiet for a time in the new position will overcome, and which sometimes is severely trying. In painful conditions of this disease the relief obtained will, however, have the patient bear this transient inconvenience.

The contour of the deformity, whether sharply angular or rounded, speaks for the involvement of one or several vertebral bodies, and during the active stages of disease measurably indicates the prognosis, through the number of bodies involved along with possible paralytic symptoms and lardaceous kidneys.

Conditions of disease primarily of the anterior portion of the body, if the surmise is correct, seem more particularly benefited by leverage; though in a bulging spine, denoting as it does the infiltrating effect of the disease in the body, leverage has an equally beneficial effect.

The device that I have recently put in practice is virtually the reverse of the preceding method; the patient being placed on his abdomen instead of his back, giving, as it does, such anatomical rest to the spinal muscles as to secure the possibility of a bony repositional effect by greater leverage than where muscular tetany must exist. Sheeting the width of the patient's body is stretched from the ends of the frame and allowed to sag proportioned to the deformity and extent of leverage pressure to be practised. Here a caution should be given regarding too severe spinal pressure, and the need of adding additional padding anterior to the stretched cloth over the abdomen. The upper thorax and pelvic straps of adhesive plaster secure a more perfect form and immobility of the sheeting strip. The padded rod is then screwed down to the process of the diseased spine, tentatively and slowly obtaining as marked a leverage as the comfort of the patient and medical judgment will indicate. The body is then encased in plaster bandages as in the previous method, securing, as it does by this position, a markedly less weight pressure upon the diseased vertebræ, uninfluenced by the

muscular sense that may be awakened by discordant muscular effort.

When the cast has hardened the patient can be lowered to the pad below, and the sheeting trimmed as best suits the operator.

SURGICAL PHASES OF ENTEROPTOSIS.

By John G. Clark, M.D.,
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It is with some hesitation that I present this paper upon "The Surgical Phases of Enteroptosis," for the present status of this question does not warrant the establishment of dogmatic lines for the operative treatment of general ptosis of the abdominal organs, and were we, with our limited knowledge, to assume that this condition belongs largely to the surgical domain, even a greater number of unjustifiable operations would be performed than has been noted in the treatment of nephroptosis. It would be better, therefore, to consider these cases under the caption of "Surgical Treatment of Cases of Enteroptosis in which Medical and Mechanical Means of Relief have Failed."

Since Glénard first wrote his classic article upon the disabilities produced by descensus of the abdominal viscera, comparatively little progress has been made in the diagnosis and treatment of enteroptosis until within the last few years.

The Röntgen Ray in Diagnosis. While, with certainty, dilatation and descensus of the stomach had been diagnosticated before the application of the *x*-ray for this purpose, the determination of the exact extent of ptosis of the large intestine and of the mechanical disabilities produced by it was, at best, more or less hypothetical. For several years I have systematically employed atmospheric distention of the colon for the purpose of defining its position, but this has always been an uncertain method. The use of the

sigmoidoscope is also unproductive of results. The recent employment of the *x*-ray for the purpose of determining the extent of ptosis of the colon and of the stomach is one of the most valuable additions to our clinical methods of examination, and has largely made up the deficiencies which have been noted in our previous diagnostic procedures. Having studied a large number of cases, with and without the aid of the *x*-ray, I now feel that it is an absolutely essential factor in formulating any plan of surgical treatment in these cases, except when the ptosis is encountered in the course of an operation for some other more important indication. Then the history of the case so far as it relates to the symptoms of indigestion, intestinal pain, tympanites, etc., must be the surgical guide.

Enteroptosis Primarily a Medical Condition. At the University of Pennsylvania there is a group of young men in the medical and Röntgen-ray departments who have been systematically studying the question of enteroptosis from the diagnostic and therapeutic standpoints for the last six or eight years, and some of the best literature has emanated from this source. The surgical consideration of this subject, therefore, has been of great interest, for I have felt that with this group of enthusiastic colleagues, who have investigated the question so thoroughly from the medical aspect, it is possible for these patients to have the best treatment before resorting to any surgical means of relief.

From the experience of these investigators, it is very evident that a majority of patients suffering from various ptoses of the abdominal viscera may be so much relieved, or cured, that surgical intervention is unnecessary. One is safe, therefore, in making the statement that thus far we may look upon these various conditions as belonging to the province of a skilled physician, and only when he fails, and largely by his advice, should operative intervention be considered.

In the gynecological department of the University of Pennsylvania Hospital it is a rule, after arriving at a determination

that enteroptosis is the sole or chief factor in a patient's major symptoms, to at once transfer the case to the medical wards for treatment. It is not a matter of regret to say that only a few of these cases are referred back to us for surgical treatment, for the patient, if not actually cured, is usually sufficiently improved in her general condition to be satisfied with the result, and prefers even moderate relief to a questionable cure by operation. We employ the term "questionable cure" after the study of our cases, for while we have had a number of brilliant results we have also had several failures. Consequently, it may be said that up to the present time there is no plan of surgical treatment which offers a maximum certainty of cure, even when the physician fails to relieve the patient by medical and mechanical means.

Therefore, as a preliminary statement, one may say that the surgical treatment is still open to question, but it is our hope, based upon the study of a considerable number of patients, that we may further elaborate principles for guidance in cases of exaggerated ptosis, incurable by other than surgical means, that may prove reasonably efficacious. These cases are usually grouped under the ill-defined terms neurasthenia, dyspepsia, indigestion, and reflex neuroses, all of which names are employed as mere subterfuges, for they do not define any given disease.

With increasing experience I have come to look upon the so-called "reflex pains," referable to the abdominal viscera, as of minor significance. Until Glénard's disease was more generally recognized and understood, the pelvic organs were looked upon as the source of a multitude of these symptoms, in fact they were considered veritable plague spots for reflex emanations.

A dangerous "pelvic myopia" was fostered in the past by this reflex theory, for under its guidance many a minor pelvic ailment has been corrected, while the symptoms of a major abdominal lesion may have been overlooked under the hazy cloud of reflex symptoms. This has especially been true in

cases of chronic gastric ulcer, cholelithiasis, and notably of enteroptosis. That the teaching along this line is becoming broader is quite evident, for in any modern medical school where cases are systematically studied in ward classes, it is seldom indeed that even the poorer students will fail to recognize a well-defined group of symptoms pointing to ptosis of the abdominal viscera as their cause. In gynecological cases these ptoses are especially likely to occur, for the descent of the viscera may be a sequel to rapid childbearing or difficult labors, which leave in their train diastasis of the recti muscles and relaxation of the pelvic floor with a retroflexion or a prolapse of the uterus. Time and again I have seen the pelvic symptoms, incident to the pelvic disability, entirely relieved by operative intervention, but the patient continued to suffer with all of her gastro-intestinal symptoms, not because they were reflex but from the fact that the ptosis, which was coincident with the pelvic disability, was quite as bad after the operation as before. It has been this class of cases which has drawn my attention to the various means which may be adopted for the cure of the patient.

Variation in Symptoms. There is no set of cases which shows such a wide variation of symptoms in proportion to the lesion as this. In one case the stomach, colon, and kidneys may all be in an exaggerated degree of descensus, and yet very few symptoms are evident. In other cases of less ptosis the functional disturbances are very decided. The use of the *x*-ray gives us much information in these cases for, in one set in which there are decided symptoms, a deep notch may be found in the smaller curvature of the stomach, in another a marked prolapsus of the transverse colon is noted, while in a third the bismuth injection reveals a redundant sigmoid. In one other class of cases even a greater degree of ptosis is noted, and yet there are no abnormal detention points; hence, peristalsis carries the food onward without serious impediment.

If, therefore, an operation were to be instituted in every case, simply because the *x*-ray demonstrated even a marked

splanchnoptosis, I am sure we would pass through as irrational a period of surgery as has been exhibited in the treatment of movable kidneys, and as I fear is being shown at present by the seeker after surgical novelties in the employment of gastro-intestinal anastomosis for all sorts of stomach lesions. The very fact that thousands of physiologically movable kidneys have been anchored most unjustifiably, should be a warning against the inauguration of a similar policy with reference to ptosis of the intestinal tract.

In the neurasthenic individual who complains of indigestion, nervousness, etc., and who has, as an incident, a movable kidney, there is no procedure less likely to bring salutary results than the anchoring of the kidney. Nephrorrhaphy in such cases is an opprobrium to surgical art, for these patients are not relieved but on the contrary are made worse, as is every neurasthenic who is not relieved by an operation; for their morbid, intraspective ideas of disease become all the more fixed by this failure.

From our experience with the use of the *x*-ray as a diagnostic means, we find we are more nearly able to select those cases in which mechanical defects are noted, which may possibly be corrected by operation so that the gastro-intestinal function may be carried on without painful or disabling symptoms.

Surgical Grouping of Cases. As we have encountered these cases they may be grouped for consideration under the following headings:

1. *Cases of Congenital Habitus.* As Smith has pointed out in his excellent article on this subject (*Transactions of the Amer. Gynec. Society*, 1906), these cases are characterized: (1) By a flabbiness or hypotonus of the body tissues; (2) by a lack of vital energy; (3) by a more or less pronounced backwardness in development. Symptomatically the patient complains of "inability to carry on her work without exhaustion, nervousness, oftentimes melancholy, constipation, and disturbances such as of digestion and other functions,

such as those of menstruation and urination. Patients commonly have pain in the back, in one or both sides, and in the lower abdomen, bearing-down pain, and leucorrhea." In other words, a type of neurasthenia in which the body may be aptly likened to a fully equipped electric plant with a dynamo too small to run it.

A surgeon who believes he can make good this dynamic defect by any operation upon the ptosed organs will find that his energies are badly directed, for little can be done for these cases by the physician, and only harm can follow surgical intervention, except in the rarest exceptions. Therefore, it is most unwise to attempt surgical treatment for a bodily habitus which does not involve one organ, but usually all in the abdominal cavity. To tack up one or both kidneys, to suspend any of the hollow viscera, or to shorten the ligaments of the uterus, only corrects one small part of the general trouble, and as a result of the operation a pathological condition may be left behind which imposes a still greater burden upon the defective dynamo and makes a more helpless neurasthenic of the patient than ever.

2. *Acquired Cases from Natural Causes.* This class is especially noted in women who have rapidly borne children without proper obstetrical care and puerperal supervision. The pelvic viscera drop into vicious ptosis due to the failure to repair the pelvic diaphragm and the inefficient return of the abdominal wall to its normal tonicity. Under these conditions the abdominal viscera lose their ventral support and tend to sag, and sooner or later the train of symptoms so characteristic of this condition appears. These cases, if treated at a reasonably early period, respond splendidly and give most satisfactory results. In many instances Webster's operation, in addition to the surgery necessary to restore the pelvic floor and the uterus to normal, effects a perfect cure.

Another group of cases, which I am convinced comprises a large number of cases, includes women of very constipated habit. When one realizes that the colon is merely a reservoir

for inspissated solid particles of feces, and that two of its sections, the transverse colon and the sigmoid, are very movable and may be greatly dragged upon by overloading, it does not seem possible to escape the conclusion that when the constipation extends, as it frequently does, over days and has been a habit for years, ill results from this undue traction upon the mesenteric attachments and the stomach, which is linked with the transverse colon, must inevitably take place. Especially if, in addition to this had habit, the patient subjects herself to excessive pressure and constriction of the abdominal wall incident to a tight corset and clothing suspended from close-fitting waist bands. In this class of cases, ptosis of the sigmoid, transverse colon, and stomach are likely to be noted in the order named. In some of our cases the sigmoid flexure has apparently been the chief trouble, for when its position was changed by operation so that it could not fall into a loop lying crumpled up in Douglas' cul-de-sac the symptoms were relieved. In such a sigmoid the constipation may increase to a type of fecal obstruction, for the greater its impaction the more acute becomes the kink at the brim of the pelvis and the greater the lateral pressure on the rectum. Such cases are likely to alternate between periods of obstinate constipation and free diarrhea, and may be characterized by more or less mucus in the stools.

Also, I am convinced that many of our women patients who have pains ascribed to the left ovary are really suffering from either a sigmoid ptosis or actual tension pain from the pulling of the sigmoidal mesentery over the brim of the pelvis. In the most exaggerated forms of this dislocation actual obstruction or gangrene of the sigmoid may occur. Such a sequel as gangrene is extremely rare, for after heroic dosing with purgatives and injections of drastic enemeta an evacuation is effected. In this class of cases I have resorted to three measures: Festooning the redundant sigmoid back into the loin by means of its own mesentery; actual suture of the sigmoid to the ventral wall; and resection of the sigmoid.

In cases of extensive ptosis of the transverse colon, with kinking either at the hepatic or splenic flexure, omentoventral suture (Coffey operation) has been employed, and in one case in which there was a recurrence with a return of obstructive symptoms, fourteen inches of the transverse colon was exsected and an end-to-end anastomosis was done, with perfect relief of the patient.

3. *Acquired Cases from Postoperative Adhesions, Hernia, or following the Removal of Large Tumors.* Every surgeon realizes that postoperative adhesions, when general, produce an infinite variety of intestinal symptoms from tympanites, constipation, regurgitation of food, to actual abstruction and gangrene. It is with the chronic cases affecting the colon and stomach that this paper particularly deals.

No operation is more unsatisfactory than the breaking up of universal adhesions among small intestines, for a recurrence of symptoms is usually noted from reproduction of adhesions. Such an operation is truly a hit-and-miss procedure. On the other hand, in many cases, the omentum gravitates to an inflamed area, or into a hernial sac, and becomes fixed by adhesions. Such fixations rarely give rise to exaggerated symptoms, as every surgeon knows; on the other hand, occasionally the transverse colon may be dragged into such an unnatural position that its well-known physiological ability to functionate, even under the most adverse conditions, is circumvented and a ptosis and partial obstruction of the organ not only occurs, but the stomach is likewise drawn out of place and the pylorus may be kinked sufficiently to give rise to gastric symptoms.

These cases are determined especially well by the x-ray, and respond most satisfactorily to surgical treatment, namely, release of adhesions and attachment of the omentum higher up to the ventral wall by Coffey's method.

In both Class 2 and 3 the stomach is usually drawn downward by the gastrocolonic omentum, and the gastric symptoms may be the chief ones.

Postoperative Care of These Cases. Many surgical results are vitiated by a too early release from the surgeon's supervision, and of all cases there are none to which this mistake worse applies. To perform any one of these operations without the most careful supervision of the patients subsequently, will lead more often to failure than to success. Therefore, the bowels should be carefully regulated to prevent a recurrence of constipation, and a carefully fitted abdominal binder or corset should be worn for months.

Review of Results. From a review of our case histories certain very suggestive factors are brought out: In the first place, all of these suspension operations which are done with a view to lifting the viscera from a distorted position into a normal one, so that they may functionate properly without pathological symptoms, fly in the face of anatomical laws and are always attended with a considerable risk of recurrence. This comes from the fact that, at best, the points of suspension are frail, and unless firm adhesions take place between the points of peritoneal contact, there will inevitably be a recurrence.

Notwithstanding all of these objections, our cases, which now number thirty-five, show about 50 per cent. of symptomatic cures, and the remainder give the usual story, some being slightly improved, some no better, while one or two claim to be worse than before operation and one died subsequent to operation.

Types of Operation. Among the operations which have been performed is Webster's, which consists in taking up a relaxed abdominal wall by bringing into apposition the recti muscles, and thus overcoming any further tendency to a diastasis, which, in a sense, permits a variety of large ventral hernia. In these acquired cases some of the best results are noted, in that a return of the abdominal muscles to their normal restores the intra-abdominal force and visceral equilibrium, so that after a short time the patient's symptoms disappear.

As observed in our cases, childbirth, after any of these operations for ptosis, may be followed by a recurrence. This is probably due to the fact that the uterus in its upward growth pushes the intestines out of the way and temporarily relieves the suspension points of weight, but as soon as the child is born there is again dragging upon the points of fixation, with the probability of their breaking away, especially if the anterior abdominal wall is very flabby.

The operations which we have largely employed, in addition to the Webster operation, are: Suspension of the sigmoid in cases of great redundancy and the suspension of the transverse colon by omentoventral suture (Coffey method). In no case has gastro-enterostomy been performed, and only twice have we performed the operation suggested by my colleague, Dr. Beyea, for the shortening of the gastric ligaments.

In pronounced cases of ptosis of the stomach Beyea's operation, however, holds out a very satisfactory prognosis for relief, for in a considerable series of cases in his own hands the results have been very gratifying.

The operative conditions to be met in ptosis of the stomach are kinking of the pylorus and marked dilatation. In these cases the value of the *x*-ray in determining the difficulties in the case is very great, for by this means one can usually estimate the amount of kinking at the pylorus. If the pylorus is situated low and the stomach assumes a perpendicular position, symptoms of ptosis are usually absent because drainage of the stomach is very satisfactory. In such a case it would be most unwise to interfere in any way with the position of the stomach, for to lift it would most likely produce the very distortion which, up to that time, has not occurred, viz., kinking at the pylorus. If, on the other hand the cardiac end of the stomach has become greatly dilated and pouch-like, necessitating the injection of food through a kinked pylorus, some mechanical restoration may be necessary. This is quite significant in the

exaggerated cases with symptoms. In some of these cases the Beyea operation is of value, especially if there is no associated ptosis of the transverse colon. If this is present it may be necessary, after shortening the supports of the stomach, to relieve the stomach of the extra weight of the transverse colon by suspending it by means of the omentum. When the stomach is greatly prolapsed, so that it occupies almost or quite a pelvic position, it might be advisable to close the pylorus and perform a no-loop gastro-enterostomy. Upon this point I have had no experience, for I have seen no case in which this procedure seemed to be advisable. In one case, which I have recently observed, where a single gastro-enterostomy was performed by another surgeon, there was a type of vicious circle established through failure to close the pylorus. In this case the *x*-ray showed the bismuth passing out of the pylorus as well as the artificial opening, both, however, meeting below the site of anastomosis in the form of a whirlpool.

Conclusions. From a review of our experience we may draw the following tentative conclusions:

1. No case of enteroptosis should be operated upon until medical and mechanical means have been exhausted without relief.

2. Cases of ptosis due to a congenital habitus will not be relieved by operation except in the rarest instances; they should not be considered, therefore, as amenable to surgical treatment.

3. In order to arrive at an accurate estimate of the degree of ptosis, the *x*-ray should be employed.

4. In cases following childbirth, where the abdominal wall is very lax, thus destroying the equilibrium between the extra- and intra-abdominal force, resection of the relaxed ventral tissue through the method suggested by Webster may give perfect relief, provided the diastasis has not been of such long standing that the abdominal organs are far below their normal levels.

5. In the latter case, in addition to the Webster operation, it may be necessary to suspend the colon by means of the omentum, thus relieving the stomach of the weight of this organ, and at least temporarily supporting the stomach until there may be a natural shortening of its ligaments.

6. In a simple gastroptosis without participation of the colon, the Beyea operation may be the one of preference.

7. If the cardiac end of the stomach has been greatly dilated, forming a kink at the pylorus and a decided notch in the lesser curvature, a no-loop gastro-enterostomy may be necessary with closure of the pylorus. (This is merely a suggestion, for the writer has had experience with this operation in but one case.)

8. In exaggerated cases of ptosis of the transverse colon, where a pendulous loop is formed which produces stasis of the fecal current, as well as tending to twist upon itself, with symptoms of partial obstruction, nothing less than excision of the redundant loop with end-to-end anastomosis will cure the case.

9. In cases of redundant sigmoid, with more or less constant pain in the left side, associated with obstinate constipation, a suspension of the sigmoid so as to pull it up out of this bad position in the pelvis may give entire relief. On account of the constant mobility of the sigmoid a recurrence may be noted.

10. In exaggerated cases of redundant sigmoid, attended with symptoms of extreme constipation verging on to obstruction, a resection of the sigmoid may be advisable.

11. In all cases a carefully fitting abdominal support, or carefully adjusted straight front corset, should be worn after operation in order to give as much artificial support as possible.

CLINICAL SESSION AT CHARITY HOSPITAL.

Introductory Remarks by E. Denegre Martin, M.D.,
New Orleans.

At the request of the Council, no operations will be performed at this clinical session, but there will be an exhibition of cases illustrating the work we do in this hospital, and which will also give you some idea of what is being done in the extreme South. We have right to be proud of this institution. It is the oldest in the South, and some of the famous men in the South have done their work here. We may begin with Stone, who was the first to advise thoracotomy in cases of empyema and drainage, with removal of the rib in abscesses of the liver. Smythe did the first ligation on the innominate artery. This was done in pre-aseptic days, and it is quite remarkable on that account. Then I may mention the names of Logan, Richardson, and Miles, men who did great work in this institution. We have with us still some men whom you all know and of whom we are very proud—men who have contributed a good deal to medicine and surgery. We have with us still Dr. Souchon. I will not enter into details of the work that has been done by these men. I will simply say that Dr. Souchon has retired from active practice, but is doing magnificent work in the institution. Dr. E. S. Lewis has done more gynecology than any man in the South, and has said less about it. This institution is proud of Dr. Parham, who first rendered the obstetrical wards free from puerperal sepsis, and today our records are as good as those of any other institution. Then, we have Dr. Matas, who

has recently introduced an operation in surgery for the purpose of obliterating aneurysmal sacs.

Again, we have a reputation which is second to none in gunshot wounds. We have also a reputation unprecedented as to the number of perforations and as to recoveries, and this morning I shall show you a man who was operated on as far back as September, 1890, by the late Dr. A. B. Miles. The case was one of three perforations of the omentum and sixteen perforations of the bowel. Here is the man, gentlemen, to speak for himself. I do not know of any case that excels this in the number of perforations. The case is rather remarkable in this respect: The man happened to be sick and vomited his breakfast. He afterward, in cleaning his pistol, accidentally shot himself, the ball entering two inches above the pubes in the median line, making all of the perforations I have referred to. He made an uneventful recovery.

Dr. Bass has recently returned from Europe. During his trip to England he had an opportunity of studying the subject of the opsonic index and of bacterial vaccines under Wright, and probably knows more about it than anyone here. Having worked in Wright's laboratory, he can probably tell us how much or how little there is in it. Personally, I have always looked on the little side of the subject.

VACCINE THERAPY, PLEURITIC EFFUSION, GONORRHEAL EPIDIDYMITIS, COLON BACILLUS PYELITIS.

By C. C. Bass, M.D.,
New Orleans.

VACCINE THERAPY.

I desire to call your attention to a few points in the treatment of disease with bacterial vaccines, sometimes called opsonic therapy.

As the first case cannot be brought over from the ward, I will discuss it without the patient. The patient has been under the ordinary treatment for tuberculous arthritis of the knee. The diagnosis, as made clinically, apparently was correct. When she came under our observation we tested the opsonic index to ascertain whether vaccines would probably benefit, and to determine the correctness of the diagnosis. The first tuberculo-opsonic index was 0.95. The next was 0.96, the dates being December 3d and 7th. On December 10, tuberculo-opsonic, index 1.00. The three determinations showed the tuberculo-opsonic index within the normal limits as set by Wright and Douglas, viz., 0.8 to 1.2, and therefore contra-indicated the diagnosis of tuberculosis. Though there was a negative history of gonorrhea, we had some smears made from the vaginal discharge present. Gonococci were demonstrated by myself and the pathological department of the hospital independently. On December 10 the gonococco-opsonic index was 1.47. Four days following it was 1.7, far above normal each time. The patient was found to be recovering or rapidly improving with these indices. The patient was not put under vaccine treatment because her opsonic index was well above normal.

The diagnosis of tuberculosis was contra-indicated by the normal tuberculo-opsonic indices.

PLEURITIC EFFUSION.

I wish to call your attention to the next patient, which throws light on both the diagnostic and the treatment side, it being one of pleuritic effusion. The patient was admitted to the hospital having pleurisy with effusion of two or three weeks' duration. The patient came in on November 10. At several different times, or at frequent intervals, the opsonic index was determined and found to be far below the minimum normal variation of 0.8 every time. The fluid was clear, which seemed to confirm the diagnosis of tuberculous pleurisy. Bacilli were not found. A rabbit was inoculated with the fluid, and died four weeks afterward of tuberculosis, thus confirming the diagnosis of tuberculosis. The opsonic index indicated all the time that the diagnosis of tuberculosis was correct. The patient has been under treatment with tuberculin, but there has been very little or no favorable reaction.

The next point I desire to call your attention to is that the opsonic index of the blood serum was 0.73 on December 10; whereas that of the fluid removed from the chest was 0.07, or one-tenth that of the blood serum. The tubercle bacilli were multiplying in the pleural cavity all the time, but not growing in the blood serum. Bacteria develop only in locations of low bacterial resistance. Where the opsonic index was 0.07, by withdrawing the fluid it was not a long time before there was a return flow of fluid from the blood, stronger in opsonins than the fluid present before. Hence benefit may be obtained by simply aspirating the chest and removing the retained fluid. On the 16th the tuberculo-opsonic index of fluid from chest, 0.18, almost three times greater bacterial resistance than the case exhibited six days before, showing the benefit to be derived from the withdrawal of fluid and allowing it to return, much stronger in antibacterial elements.

GONORRHEAL EPIDIDYMITIS.

We have a case of gonorrheal epididymitis, with considerable posterior urethral involvement, and also arthritis. The diagnosis was confirmed by demonstration of the gonococcus. The patient had been in bed two weeks, with high fever and pain. The gonococco-opsonic index, taken on December 6, was 0.23. Understand, the opsonic index simply indicates the ability of the patient's serum to prepare bacteria for phagocytosis, which absolutely depends on the opsonins present in the serum. In the absence of opsonins, leukocytes cannot take up bacteria. In the presence of serum, depending on its richness in opsonins, we can rely on the phagocytes to take them up, provided the phagocyte is at all healthy. This patient's gonococco-opsonic index on December 6 was 0.23; three days afterward it was 0.46. On that day he was inoculated with 20,000,000 of gonococcus vaccine, made from the bacteria grown from his urethra. I do not insist on connecting the clinical improvement with the administration of the vaccine, but I do want to connect it with the high opsonic index. Two days thereafter the opsonic index was 2.57; two days later it was 2.88. On the 16th the opsonic index was 5.19. On the 10th the temperature was 102°, and he was as sick as at any time. On the 11th the temperature reached normal once during the day. On the 12th it was demonstrated that he had a normal temperature all the day, and ever since, clinically, there has been rapid improvement. I want to associate the high opsonic index with the clinical improvement of the patient, and the low opsonic index with the other side. The same thing may be true of the first case mentioned.

COLON BACILLUS PYELITIS.

This is a case of colon bacillus pyelitis from which, through the ureteral catheter, we withdrew the colon bacillus. In this case the trouble is of three years' duration, following an

attack of renal colic and the passing of stones. According to all methods of diagnosis the doctors have been able to apply, the patient has no more stones, but he has continued to have bacteriuria, with inflammatory symptoms in the bladder, in the pelvis, ureter, and also symptoms referable to the prostate. Before inoculations were carried out the opsonic index, taken on consecutive days, was 0.8 and 0.9 on two separate days. He was put on colon bacillus vaccine, and his opsonic index has ranged from 23.00, the maximum reached, down to 5.4. The point I wish to call attention to is this, that the patient, clinically, was progressing favorably, so much so that Dr. Hune, who has seen the patient, and I were thoroughly convinced that the patient was rapidly improving. The urine was clearing up. The patient was feeling better than at any time in three years. At about this time I had the mumps, and was in bed for three or four weeks. In the meantime he had not received treatment, and on my return I put him back on the treatment. This time I inadvertently gave him a double dose of colon bacillus vaccine to hasten matters, as I thought. I had been giving him 50,000,000, 75,000,000, and 100,000,000 doses. This time I gave him 200,000,000. In two days after that he had a chill and high fever, accompanied by great pain and soreness in the affected region, and Dr. Hune pressed out from the prostate a large quantity of pus containing chiefly colon bacilli, and the pus cells were also full of colon bacilli. I had apparently cut down the patient's resistance with this overdose until I had done much damage. The patient was in bed two or three days, but finally improved, and for a month and a half he was not treated. I went away. He continued to improve for about a month and a half, and began to get worse while the treatment was discontinued; but for the last two months he has taken up the treatment again. Following the bacteial inoculation of 50,000,000 of autogenous colon bacilli, he has now an opsonic index of 18.68. I would draw attention to the point that it is possible by bacterial vaccines

and the raising of the opsonic index to get the bacterial resistance very much above normal. In most of the chronic cases, we have the opsonic indices running far below normal.

Practical Application.

Now, if you should operate on such a case for a localized tuberculosis, or a localized bacterial infection of any kind, if the operation be done during an extremely low opsonic index, you would subject the patient to the risk of disseminating the disease. On the other hand, if you were to operate on such a case when the opsonic index is higher, your results are likely to be better. If you aspirate a patient for a tuberculous abscess when his opsonic index is high, the flow of the serum that takes place of the fluid removed would be of much higher potency than would obtain when the patient's opsonic index is low.

RESECTION OF THE RIBS FOR SARCOMA, TUBERCULOUS URETER, EMPYEMA OF THE GALL-BLADDER.

By F. W. Parham, M.D.,
New Orleans.

RESECTION OF THE RIBS FOR SARCOMA.

I REGRET very much that the first patient I was to show you has not arrived in town on time. However, I will simply say that this was reported in full in the TRANSACTIONS of this Association some years ago. It was a case of resection of the third, fourth, and fifth ribs for sarcoma, the operation having been done in August, 1898. The patient has not had a recurrence. I will not make any further remarks on this case.

TUBERCULOUS URETER.

I want to show you this specimen, which is of unusual interest. It is a tuberculous ureter taken from a young lady one year after the kidney had been removed. The symptoms continued. She was not better in any respect that I could see, and so I had her come to the sanitarium again. After making an attempt to catheterize the ureter, we had found it impossible to get anything into the meatus. I was not able to ascertain, therefore, what was the condition of the ureter. I had suspected stone, on account of the constant presence of blood corpuscles in the urine, upon which our Fellow, Dr. Ransohoff, has laid so much stress as diagnostic of stone. She had been repeatedly radiographed without result. Tubercle bacilli had been found in the urine. Her indisposition continuing, I had operated to remove the kidney, which seemed comparatively healthy. The condition of the patient on the table was so bad that I was unable to continue

the operation, and did not explore the ureter. She continued to pass blood in microscopic form. I still felt she had a stone, but had not discovered it. As tubercle bacilli had continued to show in the urine, I made a diagnosis of tuberculosis of the ureter, but had no further evidence of stone. This specimen, which I show you here, I removed through a combined postero-anterior incision, dissecting loose the upper posterior end, after opening the old incision, then extending the incision downward and forward until I reached the pelvis, then made an opening through the peritoneum, ligated the ureter, cut it close above the ligature, touched the stump with carbolic acid, pulled the stump into the peritoneal cavity, drawing it down until I was able to cut it off close to the bladder, the wall of which was turned in with a purse-string suture. She made a good recovery. I found the procedure quite feasible. The chief difficulty was encountered at the site of the old incision, where the kidney had been removed one year previously. Here a dense cicatrix had formed, in the midst of which was a dirty, suppurating focus. However, this part of the incision healed under packing, and did not materially delay her convalescence. The ureter is shown here in two sections, the whole ureter being very much enlarged and thickened and the lower section showing two calculi *in situ* at the lowest normal constriction of the ureter. I present this specimen especially on account of the presence of these undiscovered stones, *undiagnosticated* in a ureter clearly tuberculous, which had been properly *diagnosticated.*

EMPYEMA OF THE GALL-BLADDER.

This case is one in which there was a mistake made in diagnosis. There were absolutely no symptoms to indicate gall-bladder disease. The patient was a gentleman at the head of one of our educational institutions in Louisiana. He came to the city to consult a genito-urinary specialist for hematuria, for which he had been treated for some time. On

the way to the city, about two o'clock in the morning, he was taken with a sudden severe pain in the region of the appendix, which was associated with what appeared to be appendicular colic, and the symptoms of appendicitis seemed present when I saw him twenty-four hours after he reached the city, the temperature then being 101°. There was distinct rigidity of the right rectus muscle. It seemed undoubtedly appendicitis, but the patient was unwilling to have anything done at that time. I thought it better to see him later during that day. As time went on the symptoms became more aggravated, and so I determined to operate on him for the removal of the appendix. When I opened the abdomen I felt a tumor, which was very much like a floating kidney, low down in the abdomen. I had not been able to feel this tumor previously on account of the rigidity of the muscle on the right side. When I enlarged the incision, this tumor was traceable upward, and was much longer than it first seemed, extending from well down in the iliac fossa up to the liver. This gentleman never gave any signs of gall-bladder disease, and for a moment I did not even think of the gall-bladder until I passed my hand behind it and followed it up to the liver. I could then feel the gallstones in it. I removed the tumor without opening the gall-bladder, and found empyema. The gall-bladder was very much distended, its wall edematous and ready to burst. I recovered from this almost a pure culture of the colon bacillus. The remarkable thing about this case is, that notwithstanding the size of it, and the very marked pathological condition in which we found the gall-bladder, he had no symptoms whatever referable to the gall-bladder. He was an unusually intelligent man, but gave no history whatever of any previous attack, and even in this attack there was nothing pointing to the gall-bladder as the seat of the trouble, and yet this is what we found. He made an uneventful recovery, and has remained well since, except for a slight hematuria, which is gradually improving. Although I have not seen him for some time,

I think it will benecessary for us to cystoscope the bladder before we can determine definitely what is the cause of the slight hematuria. There were many large stones in the gall-bladder. The stones have been lost, and I cannot show them to you. This case is reported because it was without any symptoms referable to the gall-bladder, and yet the gravity of the gall-bladder disease required the removal of the gall-bladder for empyema associated with stones. I did not take out the appendix, as I found it healthy, in fact, almost rudimentary.

I pass around the specimen for your inspection.

NOTE.—The specimen was an unusually large (long) gall-bladder, fully eight inches in length. At the time of operation it was greatly distended with purulent fluid and a large number of gallstones. The wall was markedly edematous, and appeared to be about to burst, although there was absolutely no history of any previous gall-bladder trouble.—F. W. P.

EXSTROPHY OF THE BLADDER.

By James M. Batchelor, M.D.,
New Orleans.

I have here a case of sufficient rarity to warrant my presenting it to you. It is a case of complete exstrophy of the bladder. You see there has been an absence of the abdominal wall from, and including, the umbilicus down. There is wide separation of the pubic bones. The patient has been operated on several times by me, with the result that the anterior abdominal wall has been restored and a cavity formed in the normal situation.

In casting about for some method of closing this hiatus, I considered only those that I thought might be applicable to this case, eliminating those that dealt with bringing together the pubic bones, which were widely separated in this case, and my selection was the method of Thiersch. It seems to me to be preferable to the others in that the skin surface, with its fine hair, is not turned into the bladder. This is objectionable because of irritation and precipitation of the urinary salts, due to the projection of hairs. After four operations, we have succeeded in closing the very large cleft.

This woman has a normally developed vagina and uterus, which, by the way, is not the rule, for in these cases there is usually an extreme lack of development of those organs.

The urethra was completely absent. The urine now passes out along the anterior wall of the vagina. We have accomplished in this case all that I anticipated. A receptacle for the urine has been established at the normal site; the exposed

and bleeding mucous surface, irritable, prone to infection, and causing great and constant suffering to the patient, has been furnished a protecting cover. Her pain is relieved and she has gained twelve pounds since the first operation. A carefully adjusted urinal is now worn, without inconvenience, but with great comfort.

RUBBER ADHESIVE STRIPS TO THE BACK IN THE OBSCURE PAINS OF PREGNANCY.

By John F. Oechsner, M.D.,
New Orleans.

I desire to illustrate this morning a simple method of sacral fixation. I do not know how many of you are familiar

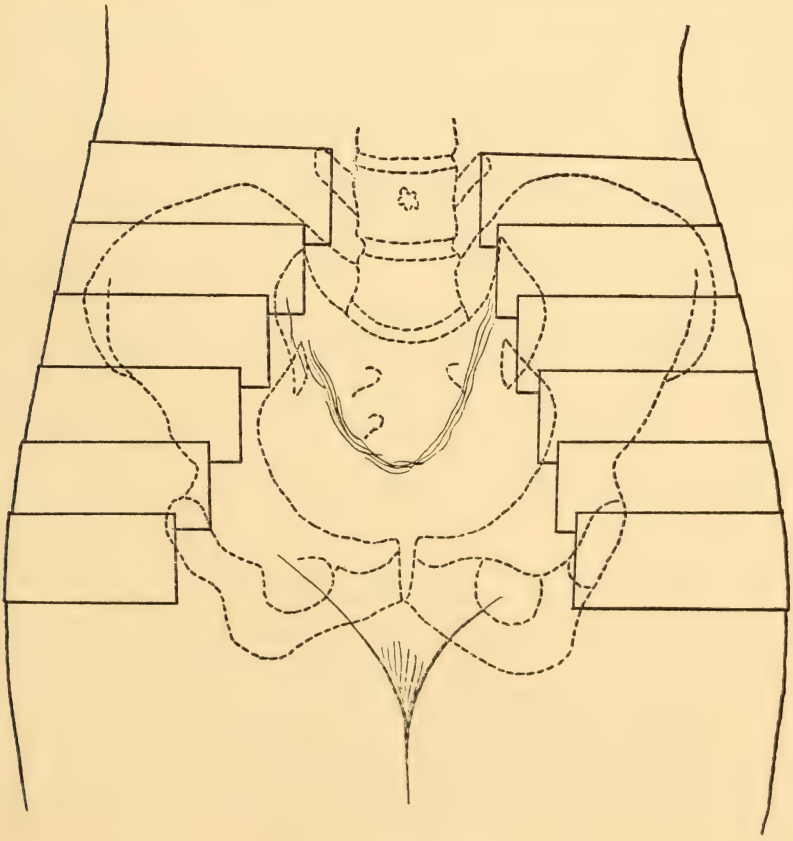


Fig. 1.—Anterior aspect.

with the excellent work being done by Goldthwait, of Boston, relative to the diagnosis and treatment of disease and injuries involving the sacro-iliac joint. His researches and experience have thrown much light upon many obscure pelvic conditions. Many gynecologists present are aware of the

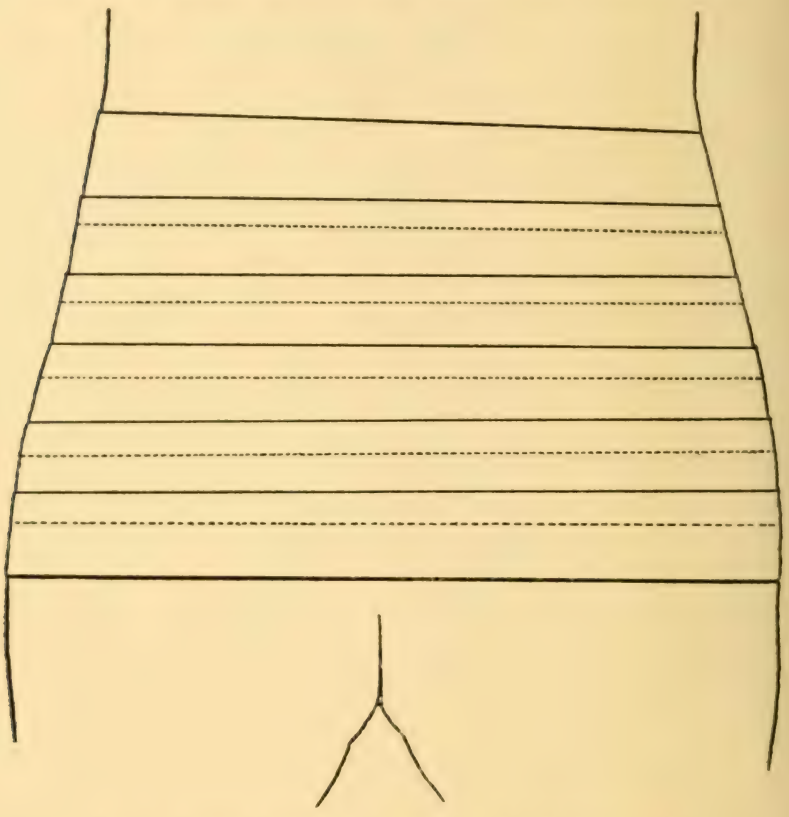


Fig. 2.—Dotted lines show degree of overlapping posterior.

fact that frequently in spite of all kinds of operations on the female genitals the patient remains sick, and we know not what further to do. She becomes a pronounced neurasthenic, is sent to the country to recuperate, and returns home little better off than before she left. Closer observations in

many of these cases shows a greater or lesser slipping at the sacro-iliac joint, with obscure pressure pains and a decided disturbance of the circulation of the pelvic viscera, as also their normal function.

Inasmuch as during pregnancy we very probably have a separation of the sacro-iliac synchondrosis, the idea suggested itself that this condition might, in a great measure, be responsible for the annoying pains incident to that state. In consequence, on several cases, I applied the imbricated rubber adhesive strips to the back, as illustrated by the accompanying figure, with marked relief to the patients. The application is comparatively simple, and if any of you have not yet used it I would urge you to try it and then note what great relief it affords these pregnant women. The strips can be made of various widths, according to the particular back you wish to strap. The strips must be brought about the body quite firmly, beginning a little below the greater trochanter and running up as high as necessary, each successive strip overlapping its neighbor by one-half.

TWIN ECTOPIC PREGNANCY, FRACTURE OF THE PATELLA, MATAS' OPERATION FOR ANEURYSM, MATAS' INTERDENTAL SPLINT.

By Joseph A. Danna, M.D.,
New Orleans.

TWIN ECTOPIC PREGNANCY.

The woman you see here this morning I simply show you as proof of the fact that the patient is here, and then we will dismiss her and discuss her case.

It is a case of twin ectopic pregnancy, which exhibited a peculiar and exciting course to me for awhile, so I thought it would be interesting to show her to the members of the Association.

I have here the specimen, which I will pass around, and want you to notice that there are two fetuses, one being about three times the size of the other; one with a fully developed placenta; the other one is a very much smaller fetus.

The question that arises now is this: Were these two fetuses contained in the same ovum? Were they impregnated at the same time, or not? The history of the case is unique in many respects.

She came to the hospital during last spring with a history of a six weeks' abortion. I removed some debris and some blood clots. About two months later I was called to see her in consultation with her family physician at her home, and found a large fluctuating mass occupying the right half of the pelvis, displacing the uterus to the left side, with the temperature ranging from 100° in the morning to 103° to 104° in the afternoon. The condition was so typical of a pelvic abscess following puerperal infection that I had no doubt in my mind

as to what was the matter with her, and brought her in here; and, without using an exploring needle, I put a knife into the supposed abscess through the vaginal vault on one side, and immediately got a gush of blood. I thought I had cut the uterine artery. I was worried for a minute, and thought the best thing I could do was to pack as tightly as possible, but had not yet gotten into the abscess cavity. I did this and left the woman alone for some thirty-six hours, when her condition grew much worse, with a pulse of 160, and a temperature of 104°. She was brought in here; I inserted my finger, intending to open the abscess by blunt dissection, and went through into a smooth cavity. Serosanguineous fluid came out, and I was amazed. I did not get any pus. I felt soft delicate tissue, which felt very much like the intestines of a baby in there, and I wondered what it was. If I had not seen this patient after her recent abortion, thought I, I should have said she had an ectopic pregnancy, but I was sure that she had aborted. I got a sponge-holder, put it in, and pulled out an arm. I was sure then I had a case of ectopic pregnancy to deal with, and what I had previously taken for a six weeks' abortion was the shedding of the decidua. She had quite a large tumor in the right iliac region, and I thought the best thing to do was to go through the abdomen, so I made a free incision, got into it, and scooped the entire sac out. After getting it out I found that I not only had an ectopic pregnancy, but I had two fetuses in two separate cavities, one of them about twice as old, apparently, as the other. The patient rallied and recovered, with the exception that she had a ventral hernia, on which Dr. Cocram has recently operated.

FRACTURE OF THE PATELLA.

I have another case I want to show you. This man sustained a fracture of the patella in August, 1904. I bring him before you to make a plea for the use of the suture of the soft parts surrounding the patella in bringing the fragments of the patella together. The man is a carpenter by trade, and

went to work about six months after he had been treated. He was able to go around as well as ever at the end of eight months. He is now doing regular carpenter work.

I have *x*-ray pictures of two other cases treated in the same manner. The functional result in this man's case is excellent. To show you how well the fragments can be brought together, I will pass around these *x*-ray pictures, the first one (Fig. 1) having been taken thirteen days after the injury. It shows that there is no bony union, but it illustrates how well the fragments are brought together.

The second case (Fig. 2) is interesting from the fact that it is a second fracture. This man re-fractured his patella five weeks after he had had it operated on the first time. I did a second similar operation on him, and this *x*-ray picture, taken about three months afterward, shows what a good result can be obtained by this method. The radiographer says that this is the best picture he has seen, and he has taken many *x*-ray pictures of cases of fracture of the patella. There was a portion of bone of one fragment broken off in the second fracture, and which was found attached at the second operation to the other fragment, showing that the union, which had taken place in five weeks, was stronger than the bone itself.

The operation followed in these cases was to suture the joint capsule on either side of the patella by means of catgut or kangaroo tendon sutures, relieving the tension of the quadriceps extensor, not by any pull on the bone, but by suturing the torn capsule. For, after all, the patella is simply a little sesamoid bone in the tendon of the quadriceps extensor, and in the operation we practically discard the bone altogether and use the capsule as the thing to bring the parts together.

I have had fifteen cases in the last four years, and after putting in one suture on either side of the patella in the joint capsule, and bringing the sutures together, the parts are absolutely reduced, and my other sutures strengthen these first two, and a small continuous suture in the torn edge of the

Fig. 1.—Fracture of the patella thirteen days after operation.

Fig. 2.—Fracture of the patella three months after operation, for second fracture five weeks after first fracture, also operated upon.

bony capsule brings the parts together more accurately. I make my incision across, with the convexity a little upward, so that the patient can kneel without trouble. He can kneel without coming in contact with the scar at all.

MATAS' OPERATION FOR ANEURYSM.

This case was operated on for aneurysm, the Matas operation having been done. It is hardly necessary for me to make any plea for a method of procedure which is destined to immortalize its originator. Any of us who have seen, or who have ever done, the only other radical operation for aneurysm, ligation above and below and excision of the sac, knows that is true. No matter how thorough the operation, the ligation of the vessels above and below, the excision of the sac in an aneurysm, which may be as large as your head, is one of the most extensive operative procedures that the surgeon has to contend with. Some of us have seen patients die of gangrene, of infection, and some of us have seen patients lose their limbs as the result of these other operations. I have put them all in one class, because they belong to a class entirely separate from the Matas operation. The advantages of the Matas operation are that by means of a simple incision you go through the skin and subcutaneous facias and through the thinnest part into the sac. Once you get in there, it looks like opening into the inside of the stomach; you look for the upper end and the lower end; you put in one or two, or two or three silk sutures in each opening, and your operation is essentially completed. It is the quickest operation you can do. It is an operation which requires a less amount of surgical skill than others, and one that does not interfere in any way with the collateral circulation. The biggest part of the incision is in the skin. The only difficulty is in finding the openings, and this becomes very easy after a little practice.

This is a fusiform aneurysm. I have brought this case before you to show you the result following the Matas oper-

ation. I am sorry that I cannot reach my other cases, but I want to make a plea for an operation which I think is going to make a New Orleans man immortal.

MATAS' INTERDENTAL SPLINT.

I wish to exhibit the Matas interdental splint, which is used for the treatment of fractures of the maxilla. The splint is provided with three interdental pieces, so that it will fit any jaw, ranging in size from that of a child to that of an adult, and the lingual portion has a slit in it, two grooves, so that you can open it or close it day after day to mould it in shape to the line of cleavage. The groove in the centre is intended to be filled with dental wax, which is softened in water, placed within, and molded over the teeth, thereby obtaining permanent fixation. This wax can be worn with great comfort.

We have treated in the hospital here some sixteen cases of simple and compound fractures by means of this splint. In two cases we have treated the jaw was broken in two pieces. The results obtained in these cases were described in detail in the *Annals of Surgery*, January, 1905.

SPLENECTOMY FOR ABSCESS AND ADJUSTABLE HODGEN'S SPLINT.

By William M. Perkins, M.D.,
New Orleans.

SPLENECTOMY FOR ABSCESS.

This 2¼ pound spleen was removed from this patient last August. A long series of malarial attacks with repeated enlargements of spleen had resulted in a splenic abscess, which had been opened by his physician. About six months later I saw the patient and made additional incisions to improve drainage. Marked improvement followed, and patient left hospital. Last spring condition grew worse, and last August patient returned to me with a history of several acute inflammatory attacks in the interim. While the patient was being prepared for splenectomy next day the abscess, which had temporarily closed, ruptured through scar and into abdomen. Splenectomy was done with difficulty. Adhesions were extensive above sinus and almost absent below, where leakage into abdomen had occurred. A localized peritonitis, treated by the Ochsner plan, gradually yielded, and after a stormy convalescence the patient is now about well.[1] A small pocket below the lower pole of the kidney was the last remnant of a very formidable sinus through the abdomen, which had remained after incisions for through-and-through drainage.

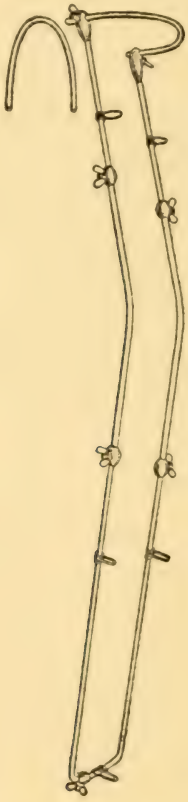
A preliminary report of this case was read before the Tri-

[1] Patient is entirely well as this goes to print.

State Medical Society of Louisiana, Arkansas, and Texas in November, and will appear in the Shreveport *Medical Journal*. The case is presented now to you because of its rarity. So far as I know, only ten other cases of successful splenectomy for abscess have been reported.

ADJUSTABLE HODGEN'S SPLINT.

The ordinary Hodgen's splint has to be fitted to almost every patient. I have here a very rough model of a splint of



the Hodgen-Brown type, but adjustable to any length or width of thigh and leg, and also adjustable for right or left

side. The sections corresponding to the knee are made of tubing bent at a proper angle, and the leg and thigh sections telescope into these tubes and make varying lengths. Braces of varying size over groin and below foot make adjustments for width and for right and left. The whole apparatus can be condensed into small space for storage.

NOTE.—The remarks of Dr. Matas are omitted at his request, on account of illness preventing his revision of the manuscript.—EDITOR.

TRACHEOTOMY FOR FOREIGN BODIES IN THE AIR PASSAGES. REPORT OF FIFTY-THREE SUCCESSFUL CASES.

By W. F. Westmoreland, M.D.,
Atlanta, Ga.

The courtesy of many throat men in my section in referring their tracheotomy cases to me, has given me an extended experience in this work.

This paper is limited to the discussion of tracheotomy for foreign bodies in the trachea or bronchi in children.

My interest in this subject was stimulated by my study of a case that I was detailed to watch in my early medical days. In this case the usual routine of the time was carried out.

The foreign body, a papaw seed, not being expelled at the time the trachea was opened, a tracheotomy tube was inserted a few minutes later.

Thus to prevent the child being choked by the mucus or seed in the absence of the surgeon, my duty was to keep the tube clear of mucus.

It took only a short time to convince me that the tube was disturbing both the patient and myself, was blocking the escape of both mucus and seed, and was a continual source of local irritation.

Contra to instructions, I removed the tube. In a short time the patient had coughed up a lot of mucus and the seed also.

I found the literature of this subject unsatisfactory, unscientific, and chaotic, practically ignoring all ideas of modern

wound treatment; filled with directions as ambiguous as absurd, a worthless heritage brought forward from period to period and preserved without rhyme or reason.

Many surgeons, however, were making a stand for immediate operation; Goss voiced their sentiments; my father had for years taught the same.

Weist, in a study of a thousand cases, arrived at the following conclusions, which voiced the majority opinion.

The presence of a foreign body in the air passages does not make bronchotomy necessary, nor should it be performed unless it causes dangerous symptoms, ignoring the fact that mortality increases with the passing moment.

How do these patients die? They choke to death or die of preventable infection.

In Weist's table there were 937 cases with 232 deaths: 103 from asphyxia, 121 from infection and 8 from hemorrhage.

These are surgical cases and immediate surgical interference is indicated.

The immediate danger is asphyxia; an immediate aseptic operation, practically eliminates all danger of infection.

Any appreciable mortality from hemorrhage is an evidence of the operator's lack of skill.

Irritation as a cause of subsequent infection will be considered later.

A word concerning the anatomy of this region, in which there are many anomalies, especially of the bloodvessels.

An interesting and instructive article on these anomalies is that of Dr. Pilcher.

The anatomy of this region is so loosely described in our anatomies and surgeries that those without practical experience or special study have no adequate knowledge or proper appreciation of the relative size of the organs involved, or the character and size of the space within the limits of which the operation is made; and I think it is due to this lack of knowledge that so many serious accidents, frequently in the hands of skilful men, have occurred.

Their idea of the anatomy remains influenced by that studied in the adult cadaver.

A few words in regard to the relative size and length of the trachea, usually about five or six tracheal rings; rarely as many as eight extend above the sternum.

While the distance between the cricoid cartilage and the sternum varies greatly, the average full distance in a child one and one-half to two years old is: length 1¼ inches, diameter ⅛ inch; between three and five years, length 1½ inches, diameter, ¼ inch; between six and eight years, length 2 inches, diameter ⅓ inch; between eight and ten years, length 2¼ inches, diameter, ⅓+ inch.

In 937 cases 712 were under ten and 474 under five years of age, so that practically three-fourths of the operations will be upon a trachea considerably less in circumference than a leadpencil and within a length of about an inch, and this crossed by vessels and also the isthmus of the thyroid.

A proper appreciation of this will prevent such accidents as cutting through the trachea, or missing it entirely.

A general anesthetic, the one you are accustomed to, should be used, carrying it only to the point of quieting; there is no pain in this region after the skin incision.

No operation except that of opening the trachea in the upper portion should be considered for a moment; all others are impractical and dangerous.

Tracheotomy tubes have no place in this operation; they prevent the escape of mucus and foreign bodies and cause irritation.

The trachea remains patent enough for all purposes without any assistance. I never use anything.

If additional security is wished, a silk thread passed through each edge of the tracheal incision, looped and knotted, gives perfect control of the trachea.

In the young the thyroid isthmus is usually in the way; it should be held with the forceps, and cut and ligated. I stitch in the ligature to prevent its slipping.

In very young stout children the thymus gland may infringe on your space, and when there is a deep receding trachea may be very inconvenient.

Depress it with a narrow retractor; do not use a tenaculum, as any injury to it may produce troublesome hemorrhage.

After the fascia is cut, the longitudinal vessels can frequently be pressed aside; crossing, transverse, or anomalous vessels must be cut and ligated when in the way.

The small veins may bleed profusely under the influence of venous congestion produced by different respiration, but collapse and cease when air reaches the lung freely.

I make it a rule to ligate all vessels, veins as well, as they are cut, and keep the incision dry and free from forceps.

A dry wound is a great safeguard, if as occasionally occurs imperative haste becomes necessary.

The weight of the dragging forceps or any pressure on the trachea will sometimes stop the breathing; this should be remembered and guarded against.

Probably the greatest danger during the operation is asphyxia from fixation of the foreign body in the glottis.

This complication probably rattles operators more frequently than any other that occurs in surgery and is the cause of most of the operative accidents.

If the operator remains cool and does not lose his head, he has two or three minutes in which to finish his operation, and still resuscitate his patient.

I have had five experiences of this kind. My plan is to finish rapidly, holding the vessels with forceps, open the trachea and insert a female catheter, and by blowing into it distend the lungs; this as an aid to artificial respiration rapidly brings them around.

The absurdity of such directions as inverting and shaking the patients, slapping them on the back and chest and thus losing valuable time is apparent.

The usual suggestions to grasp the trachea between thumb and fingers of the left hand to steady it and make it prominent is, I think, bad teaching.

The compression necessary to accomplish this is apt to displace the skin; bulging it presses the vessels into the line of incision, and makes more difficult the already impaired breathing.

A better plan is to place the pulp of the thumb on the skin just above the cricoid cartilage and make gentle traction upward; this steadies the skin for the downward stroke of the knife in making the incision.

A rather heavy scalpel, blade English shape, with razor edge, is the best knife to use.

This character of knife does not require much pressure force in its use, and held as a violin bow is held, cutting with a light free-hand movement, rapid clean dissecting is accomplished without danger of incisions being uneven in depth, and exposes vessels without cutting through them when the trachea is reached open by an incision beginning at the lower margin of the first ring.

The length of the incision should be determined by the history of the size and character of the foreign body.

If the opening is sufficiently large, the foreign body is easily expelled by respiratory effort; usually the opening is too small, and the trachea is injured by the forcible and difficult extraction of the body with forceps.

When the trachea is opened, anesthesia is suspended.

In the majority of cases, the foreign body is below into or out of the opening within a few minutes after the trachea is opened.

An accumulation of mucus is usually expelled at the same time.

If the foreign body is not expelled at once, the patient is allowed to come from under the influence of the anesthetic; the posterior wall of the trachea is tickled with a blunt probe in order to excite a paroxysm of coughing.

The foreign body is rarely impacted in any of the bronchi, but usually retained in a mass of viscid mucus, and is coughed up and expelled with the mucus.

If it is not, the tracheal wound is left open until it is expelled.

No further attempt is made to hasten its expulsion nor are any instruments introduced into the trachea for this purpose; an exception might be necessary in beans or like substances that would swell when influenced by moisture.

The use of probes or forceps or tracheotomy tubes, simply by their mechanical presence, add to the irritation and increase the danger of infection, if it is not already present.

I cannot too emphatically condemn the use of the tracheotomy tube in these cases. Why most of the surgeons continue to advocate their use I cannot understand.

They prevent the escape of the foreign body, which would otherwise escape, and by their filthy condition pave the way for a septic pneumonia.

After opening the trachea, I divide these cases into three different classes: the treatment or management of each particular case will depend largely upon the classification of the case in hand.

The first two classes are those in which the foreign body has been expelled at the time of the operation.

The first class of cases are those in which the trachea can be closed at once.

In these cases there has not been sufficient irritation or infection to produce pathological changes in the mucous membrane of the air passages.

In closing the wound I use a small round, half-curved needle with a piercing, not cutting point, and fine silk sutures. Fine silk is used for both sutures and ligatures.

The tracheal incision is closed by interrupted mattress sutures, which are passed through the membrane enclosing the trachea and into, but not through, the fibrous membrane of the trachea itself. It should never include the mucous membrane.

When the fascia is closely adherent to the trachea it is also included in the suture.

This is the most important suture and should make the trachea incision airtight.

After these sutures are placed, I fill the wound with saline solution and gently close the mouth and nostrils of the patient with my hand to see if forced respiration will force air bubbles through the incision and overlying solution; if no bubbles are seen the incision is airtight. If it is not, a few additional interrupted sutures will make it so.

The fascia, muscles, and the isthmus of the thyroid gland are next sutured; then the skin incision is closed by a continuous suture.

A surgical dressing is then applied and held in place by adhesive strips.

The second class of cases are those that though the foreign body is expelled promptly the irritation with subsequent infection and its accompanying accumulation of mucus indicates drainage for a while.

In these cases the whole incision is left patent for a while and the wound is dressed with a handful of loose bichloride gauze, held in position by adhesive strips.

This dressing will prevent the direct introduction of cold dry air into the trachea, but will still admit of the mucus that does not easily escape through the mouth being coughed through the opening into the dressing.

The gauze should be changed frequently.

Where the wound and trachea are protected in this way from the air, and the mucus promptly escapes, inflammatory symptoms quickly subside.

The third class of cases are those in which the foreign body is not expelled at the time of the operation, in which infection and inflammatory changes have occurred. These cases are dressed in the same way as class second, until the foreign body escapes and the inflammation subsides.

The loose gauze dressing does not prevent the expulsion of the foreign body.

In both the second and third class of cases, when the foreign body escapes and the inflammatory symptoms subside, the patient is anesthetized and the wound closed and dressed as in the first class.

Early in my experience with these cases I thought it necessary to exercise some control over the trachea; in other words, to keep patent; and I used to use the looped and knotted sutures through the tracheal incision as already mentioned, but I found them unnecessary, and stopped using them.

Now I use nothing and let the trachea take care of itself.

The symptoms for convenience may be diyided into three stages: (1) obstructive symptoms immediately following the accident; (2) irritation produced by its presence; (3) inflammation at a later period.

Of course, there are no distinct border-lines between these stages. In the first stage the patient may die from asphyxia due to the size of the object, or a trivial object may be caught in the glottis and produce a fatal spasm.

This spasm occurred in a patient of mine from a small piece of membrane, from a raw peanut, during the operation, and never breathed again until the trachea was opened and artificial respiration was made. If the object is irregular in shape or has sharp or rough edges, the stage of irritation rapidly supervenes, and by the mechanical injury to the delicate mucous membrane opens a pathway for infection and inflammation, and the pneumococci, usually present in the upper air passages, find a ready soil for their propagation.

The successful issue in the 53 cases I have operated upon, though representing many varieties of foreign bodies and seen in the various stages of inflammation, has been due to prompt surgical intervention and the subsequent application of common-sense surgical principles without meddlesome interference.

Each of these patients has been operated upon in the shortest time possible after seeing them; sometimes by candle light under exceptionally bad environment.

DISCUSSION.

Dr. Samuel J. Mixter, of Boston.—It has been the fortune or misfortune for a great many of us to have these cases of foreign bodies in the trachea or bronchi, and we all realize the dangers of the situation, as pointed out by Dr. Westmoreland. These cases are apt to be trying ones, and operations are done as emergency operations, and certainly there is no operation in surgery that I know of that, at times, equals a tracheotomy under difficult circumstances. A tracheotomy under difficult circumstances in the dissecting room is one thing, while a tracheotomy in a child who is asphyxiated is another thing. Since Dr. Westmoreland has referred to the importance of specialists doing these operations, if possible, I find that in the last few years I have done these operations much less frequently than formerly. The surgeon, however, must be ready to do them, and he can do them. But, I must say, I think today the trained laryngologist, with a tube and light, can save a patient from an operation in an apparently critical case. I have seen it done a great many times, and now that we have trained men and perfected instruments, unless it is an emergency case, I always refer these patients to my professional friends who are skilled in this work. I think that point is one that should be remembered, and I have risen principally to speak of it in connection with this paper.

Dr. Randolph Winslow, of Baltimore.—The remarks of Dr. Mixter are in line with what I personally think. In these times the skilled specialist is able to introduce a bronchoscope, and by so doing determine definitely the location of the foreign body at times, and even remove it, either by means of an incision in the trachea or without it, so that many of these cases can be referred, as Dr. Mixter has said, to the specialist in laryngology. However, these cases come under the care of the hospital surgeon and general surgeon with sufficient frequency, so that he must be prepared, at all times, to operate with great promptitude.

As far as I remember Dr. Westmoreland did not say whether he gave an anesthetic to these patients or not, and that is a point I wish to bring out. In one case I had in which an anesthetic was being given, the child became absolutely

asphyxiated, and my instruments were still in the sterilizer. A colleague, however, who was present had a good pocket-knife, and whilst the child was being dangled by the legs I opened the trachea with this pocket-knife. The foreign body escaped and the child got well. This is an instance showing that occasionally this work may have to be done with a pocket-knife or with whatever means that may be at our command. While I have no accurate knowledge in regard to the size of the trachea, it seems to me the sizes that are represented by Dr. Westmoreland are too small. I have reference now, of course, to the diameters. Of course, a child a year or six months old may have as small a tube as that which has been represented, but in a good many operations upon the trachea for croup in former days and for the removal of foreign bodies, personally I do not seem to have seen a trachea as small as those pictured here.

Dr. Alexander Hugh Ferguson, of Chicago.—I congratulate Dr. Westmoreland on his paper. There is very little with regard to the technique of the operation or the indications thereof that can be added, and his experience has been sufficiently large in these cases to fortify what he has said in connection with the subject.

I would like to draw attention to the method of incising the trachea. As Dr. Westmoreland has said, sometimes the trachea is missed altogether. In order to prevent such a blunder being made, I should advise those who are not probably as expert as others, who are in the development of their surgical work and have to do these operations, that they make a horseshoe-shaped incision through the trachea, and turn down a tongue-like flap. It is a simple procedure. It leaves an opening sufficiently wide for the foreign body to come up, and you do not require a tube. I began that method of incising or opening the trachea first in connection with my experimental work on dogs, and I have applied it to the human being with satisfaction.

Dr. Westmoreland (closing).—With regard to the suggestion of Dr. Mixter to refer these cases to laryngologists for the removal of the foreign body, I will say that in my paper I mentioned the fact that most of these cases were referred to me by laryngologists after they had used all efforts at removal of the foreign body and failed. These cases illustrate the character of the foreign bodies we have

to deal with, and some of them are impossible of removal through the glottis. The size of the foreign body plus the size of the forceps would have prevented extraction without greater damage than the patient could have been subjected to by a tracheal incision. One great trouble is that these incisions in the trachea are frequently made too small. It is necessary to make a long incision in the trachea so as to have abundant room to work and to remove the foreign body. In some of these cases I opened the trachea by making a long incision; one sufficiently long so that the foreign body could be easily expelled or removed through it. (Here Dr. Westmoreland read extracts from his paper with regard to the method of closing the incision in the trachea and the material used, which he had not time to read before.)

In reply to the question of Dr. Winslow, I will say that I have used ether as an anesthetic in these cases, although I do not think it makes much difference what anesthetic is used. I would suggest, however, that it is well for the surgeon to use that anesthetic with which he is accustomed. An anesthetic is not essential after one has cut through the skin, because there is no sensation beyond. I usually have an anesthetic given to keep the child quiet as much as for anything else. The child should be allowed to come out from under the influence of the anesthetic as soon as the operation is finished.

FRACTURES OF THE CLAVICLE.

By W. F. Westmoreland, M.D.,
Atlanta, Ga.

In all ages these fractures have proved an interesting field for surgical investigation, and nearly every prominent surgical name is associated with their pathology or treatment. No fracture has so taxed the ingenuity of the surgeon in providing a suitable splint to hold the broken bone in proper position with comfort to the patient, that it may unite without deformity.

To mention the numerous devices, splints, and appliances in medical literature would only fatigue without compensation. Gurlt records about seventy of varying utility. Their scope extends from the postural position of Hippocrates, the dressings of Velpeau and Devault, the splint of Sayre, to the more complicated apparatus of Hensner. All of them have objectionable features, and among them can be found appliances guaranteed to inflict more pain than the most refined instrument of torture of the Spanish Inquisition.

A glance at the surgical anatomy of the bone is necessary before entering into a discussion of the treatment.

The shoulder girdle, composed of the clavicle and scapula, is imperfect both in front and behind; in front it is completed by the sternum, with which the clavicle articulates. Thus, the framework of the shoulder is pivoted upon the trunk at the sternoclavicular articulation, its only point of osseous connection. "This articulation is the centre of all movements of the shoulder, and admits of a limited amount of

motion in every direction, circumduction included. These full movements are due to the interposition of an interarticular fibrocartilage between the joint surfaces."

While the scapula is somewhat movable upon the clavicle in the principal movements of the shoulder, those of the clavico-acromial joint can be practically ignored and the skeleton of the shoulder can be regarded as practically a single bone in dealing with this question.

The interarticular fibrocartilage seems to act as an elastic buffer to break shocks and resist pressure from the shoulder, as well as to connect the bones and prevent inward displacement. The strength of the joint mainly depends upon its ligaments, and it is to this and the fact that the force of the blow (indirect) is generally transmitted along the long axis of the clavicle that dislocation rarely occurs and the bone is usually broken. The acromioclavicular articulation, reinforced by the strong coracoclavicular ligament, is even more securely fastened.

It should be remembered that depression of this bone is principally affected by gravity, slightly assisted by the subclavius—the only muscle which acts directly upon the clavicle. The function of the subclavius is rather to limit the mobility of the clavicle than to impress motion upon it.

The muscles which raise the shoulder, as in shrugging, are the upper fibers of the trapezius, the levator anguli scapulæ, the clavicular head of the sternomastoid, assisted to a certain extent by the two rhomboids, which pull the interior angle of the scapular backward and upward, and so raise the clavicle. It is drawn backward by the rhomboids and by the lower and middle fibers of the trapezius; forward, by the serratus magnus and the pectoralis minor.

Nature seems to have recognized the exposed position and violence this bone is subjected to, and has tried to provide for the inevitable strain by great elasticity, freedom of motion, and curves to present a greater surface to decompose the force it has frequently to undergo. But with all its protection

it is the most frequently fractured bone in the body—the radius being a close second.

Of 2705 fractures treated at Middlesex Hospital in sixteen years, ending June 30, 1867, 1540 (or 57⅓ per cent.) were of the clavicle and radius, *i. e.*, 772 (or 28½ per cent.) of the clavicle and 768 of the radius.

There are several points of analogy in the fracture of these bones which are interesting: Where elasticity and curves have been given the clavicle, great bulk has been given the radius at the point most frequently fractured; in both those portions most usually fractured are, as regards muscular attachments, intermediate bones—that is, they have no muscles acting directly on them. The radius is the only osseous point of connection between the bones of the wrist and the forearm; the clavicle is the connecting osseous link between the shoulder and the trunk, this anatomical condition subjecting them more frequently to the strain of indirect violence. Nearly all the fractures of these bones occur at one particular point, and are usually oblique and the result of indirect violence. The only dissimilar point between them is the age of greatest frequency, over half the fractures of the clavicle occurring in the infant under five years of age, when the bone is soft, while fractures of the radius occur with increasing frequency after middle age, as the bone becomes more calcified, and particularly in the female. Kronlein has suggested that falls on the shoulder break the clavicle of a child, but dislocate the shoulder of an adult.

Special fractures of the clavicle are those of the sternal end, very rare; those of the acromial extremity, of which there are two varieties—one between the coracoclavicular ligament and one external to it—rare; and those of the shaft, which are frequent, most of them occurring at one point—the junction of the outer with the inner two-thirds of the shaft, which is also the junction of the two curves and the weakest part of the bone.

Fractures from direct violence may occur in any portion

of the bone, and are usually transverse in direction. Those of the two extremities are practically always the result of this character of force. But indirect violence is responsible for the very large majority of the fractures of the clavicle, and these fractures are usually of the shaft at the point mentioned, and are oblique in direction.

About thirty fractures from muscular action have been reported. Hamilton thinks incomplete fractures occur frequently, but that they are overlooked.

Considering the exposed position of this bone, compound fractures are exceedingly rare, only five cases other than the result of gunshot wounds being reported. I have had two from gunshot wounds.

A few multiple and comminuted fractures and quite a number of simultaneous fractures of both bones have been reported.

Considering the proximity of the vessels, nerves, and lungs to the clavicle, their injury is exceedingly rare, the subclavius muscle probably affording decided protection to the subclavian vessels and the brachial plexus. Complications involving the subclavian artery have occurred in about 12, the internal jugular vein in 1, the brachial plexus in 15, and the lungs in 5 cases.

The usual classical symptoms by which fractures are diagnosticated are present in those of the clavicle; and it is only in the incomplete fractures of this bone, and those of the acromial extremity, that any difficulty in the diagnosis will be found. With the exception of these, those near the sternal end and a very few transverse fractures, the displacement of the fragments, the deformity, and the characteristic position of the patient's arm, shoulder, and head are sufficient evidences of the injury sustained.

We find two kinds of displacement in the oblique fracture—one in which the fragments do not separate, the broken ends being driven slightly upward and backward, so that the bone forms an angle at the seat of fracture; the other, the more

frequent form, where the outer end of the sternal fragment is tilted up and overrides the outer acromial fragment, which is displaced inward, and always causing shortening, which frequently is decided. There are varying degrees of these two forms. The extent of the displacement depends upon the amount of violence causing the fracture and its continuation after the bone is broken. When the force is just sufficient to snap the bone, the first form occurs, but when there is a continuation of the force, the bone is driven into the more pronounced displacement.

I think muscular action plays little part primarily in causing the displacement, though secondarily it may accentuate it. The slight upward displacement of the sternal fragment is more comparative than real, and is caused by the outer fragment, and not by the sternocleido mastoid muscle. The action of this muscle is from below upward; and, at any rate, the rhomboid ligament and pectoralis major would counterbalance any action of the nature mentioned.

The clavicle braces the shoulder, keeps it erect, and preserves the interval betweed the thorax and the acromial portion of the scapula. When it is fractured, the suspensory power of the trapezius is lost and the outer or acromial portion of the scapula falls forward, inward, and downward toward the chest and median line. It is readily seen that a continuation of the force causing the fracture would increase the deformity. The cone shape of the chest is conducive to this.

If the acromion fragment has not reached its anatomical limits, it could be accentuated by the downward and forward action of the pectoralis minor, and by the serratus magnus dragging the scapula forward and inward around the chest. This position of the scapula is of the utmost importance, whether it is caused by the original force or by muscular action; in either event, muscular contraction fixes it there, and the fracture cannot be reduced until the scapula is restored to its original position. Lifting the shoulder will not

reduce it; it is only when the scapula is drawn back to its normal position that the fragments resume their normal relations.

The usual directions for the reduction of this fracture are to place the patient in a chair, or on a stool, and pull the shoulder of the injured side upward, outward, and backward, putting your knee between the patient's shoulders to assist if more force than can be exerted by the hands is needed, and while the shoulders are in this position to apply some one of the various dressings. At present, Sayre's, or a modified Sayre's, dressing is the popular one. To this, as to all others I have seen mentioned, are many objections; pain, pressure, irritation of the skin, are only a few. Even if the fracture is reduced—and I really believe it is not in the majority of instances—the fragments will slip while the dressing is being applied; and even with a proper reduction, an accurately applied dressing, and an adjustment every day, there is more or less slipping. Usually the physician compromises with the situation, puts up the fracture partially reduced, and makes a mental promise to tighten the dressings each day until there is proper apposition. This promise is rarely redeemed.

I give a few quotations from recent text-books pertaining to the results of plans of treatment:

Park's *Surgery*, 1907—"If one is insistent upon a minimum of deformity, confinement upon the back on a bed is the surest way to obtain satisfactory results."

Da Costa's *Surgery*, 1907.—"If the patient is a girl, it is desirable to minimize the deformity. Place her on her back upon a hard bed, with a small pillow under her head, a firm, narrow cushion between the shoulders, a bag of shot resting over the seat of the fracture, and the forearm resting on the front of the chest, the arm being held to the side by a sandbag. In three weeks there will be union, practically without deformity."

Stimson's *Fractures and Dislocations*, 1907.—"The physi-

PLATE I

Position of patient for reduction of fracture and application of plaster-of-Paris splint.

cal obstacles that need to be overcome in the treatment are so great, and the success that has attended the different methods has often been so moderate, that the number of plans that have been proposed and employed is very great; and the history of the treatment shows mainly a recurrence of periods marked at first by elaborations and multiplication of details and precautions, and then by abandonment of them all and the substitution of something very simple." Stimson suggested a similar plan to Da Costa's, and mentions a case where, in addition, digital pressure was made upon the fragments during the whole treatment to insure coaptation. Pick and Roberts also suggested similar plans of treatment.

These are only some of the complicated measures that have been suggested to prevent subsequent deformity.

The idea that even adult patients will submit to such measures is nonsense, and their application to very young children, in whom one-half these fractures occur, is absurd.

Patients frequently rebel and decline to submit to so simple a dressing as Sayre's, which, in some cases, is very painful, particularly when there is a tender skin.

The plan of reduction and treatment that I have taught and practised for the last fifteen years is simple and perfectly comfortable to the patient.

The fracture is reduced by position, the patient being laid flat on his back on a table; if allowed to remain this way for a few minutes, with arm comfortably by the side, the fracture usually reduces itself. (See Plate I.)

The patient is now pulled over the end of the table until the scapula clears it; an assistant supports the patient's head with one hand and the shoulders with the other; the latter hand is placed on the spine between the shoulder-blades, so the scapula can swing clear.

The line of the body is kept on a level, but the shoulders are allowed to drop to a lower level, as shown in the first picture.

The fracture is usually reduced by position alone when the scapula clears the table.

If the fracture is not reduced, the arm is slightly abducted from the side and gently pushed a little toward the head, keeping it upon the same line, and the acromion process is gently pushed back, approximating the scapula behind; this always reduces the fracture.

The reason the fracture is not always reduced by position alone is the nervous dread of the patient, which makes him stiffen and contract his muscles.

With the patient in above position, a plaster-of-Paris splint is applied.

Before the patient is placed on the table a closely fitting undershirt is put on. If only a loose one can be secured, cut it open and fit it as closely as possible; over this the splint is applied.

The plaster-of-Paris splint should come well down over the ribs, so as to support the shoulder without the edge of the plaster of the opposite side pressing into the ribs, which will occur if the body part of the splint is too short. (See Plate II.)

This is well shown in the second picture. The position of the arm of the injured side is immaterial; in the picture it is exaggerated.

It is better to abduct the arm just enough to be able to pass the bandage easily under the axilla.

I have treated by this method about sixteen patients, and have never had one to complain of any discomfort, though five of them were sent to me on account of their inability to wear Sayre's dressing.

With this splint, children are not confined at all, but run and play as they wish.

PLATE II

The plaster-of-Paris splint should come well down over the ribs.

INDEX.

Abdomen, gunshot wound of, 348
Abdominal Cesarean section, 209
surgery, postoperative complications in, 19
Abscess, perinephritic, 483
Acute dilatation of the stomach as a postoperative complication, 33
Adjustable Hodgen's splint, 542
Aneurysm, Matas' operation for, 539
Annual address of president, 1
Appendix, harmful involution of, 331
Art applied to medicine and surgery, 1

Balloch, Edward A., harmful involution of appendix, 334
hematuria in pregnancy, 431
Bartlett, Willard, pulmonary embolism, 360
Bass, C. C., vaccine therapy, 522
Batchelor, James M., exstrophy of bladder, 531
Bladder, exstrophy of, 531
treatment of, after suprapubic cystotomy for stone, 56
tumors of, transperitoneal removal of, 51
Bloom, J. D., leverage in spinal disease, 505
Boldt, H. J., diagnosis of extra-uterine pregnancy, 308
fibroid tumors of uterus, 75
harmful involution of appendix, 334
postoperative complications in abdominal surgery, 45
Bovée, J. Wesley, fibroid tumors of uterus, 77, 78
suppurative phlegmonous gastritis, 378, 390
surgery of the bladder, 63, 64
Brain, sarcoma of, 405
Brown, George S., an improved Hodgen splint for treatment of fractures of thigh or other painful affections of the lower extremity, 129
diffuse suppurative peritonitis, 276
inconsistencies of the gauze pack, 226
Brown, John Young, gunshot wound of abdomen, 354
intestinal exclusion as a surgical procedure, 337, 347
postoperative complications in abdominal surgery, 46

Byford, Henry T., cyst of pancreas, 236
management of labor, 262
postoperative complications in abdominal surgery, 42
rectovaginal fistula, 265

Caldwell, C. E., gunshot wound of abdomen, 354
recent factors in the elucidation of chronic joint diseases, 81, 93
relaxed knee-joint, 196
Carothers, Robert, relaxed knee-joint, 197
treatment of fractures, 169
Carr, W. P., management of labor, 261
postoperative complications in abdominal surgery, 43
practical points in treatment of fractures of femur, 155, 172
Cartledge, A. Morgan, some remote symptoms and effects of cholecystitis, 199, 209
Cesarean section, 239
Charity Hospital, clinical session at, 520
Cholecystectomy, 459
Cholecystitis, 199
Clark, John G., surgical phases of enteroptosis, 508
Clavicle, fractures of, 555
Cleft palate, 278
Color bacillus pyelitis, 524
Cunningham, R. M., fractures of skull, 328
gunshot wound of abdomen, 356
inconsistencies of the gauze pack, 225
surgery of the bladder, 66
treatment of fractures, 165
Cushing, Harvey, subtemporal decompressive operations for the intracranial complications associated with bursting fractures of the skull, 324, 329
wounds of heart, 185
Cyst of pancreas, 229

Danna, Joseph A., twin ectopic pregnancy, 536
Deaver, John B., cholecystectomy, 459
Decapsulation of kidney, 395
Diffuse suppurative peritonitis, 269
Dislocation at the shoulder-joint, treatment of, 94

Embolism, pulmonary, 360
Empyema of gall-bladder, 528
Enteroptosis, surgical phases of, 508
Epididymitis, gonorrheal, 524
Epilepsy, traumatic, 496
Exstrophy of bladder, 531
Extra-uterine pregnancy, diagnosis of, 308

Femur, fracture of, in forcible delivery, 125
fractures of, 155
Ferguson, Alexander Hugh, cholecystitis, 207
gunshot wound of, 358
harelip and cleft palate, 278
intestinal exclusion as a surgical procedure, 345
suture of urethral sphincter, 216
tracheotomy for foreign bodies in air passages, 553
Fibroid tumors of the uterus, treatment of, 68
Fistula in ano, excision of, without cutting the sphincter muscle, 263
Flap-sliding operation for rectovaginal fistula, 263
Foreign bodies in air passages, tracheotomy for, 544
Fracture of femur in forcible delivery, 125
of patella, 537
of upper extremity of humerus, 94
Fractures of clavicle, 555
of femur, 155
of skull, 324
of thigh, 129
Freiberg, Albert H., chronic joint diseases, 92
relaxed knee-joint and its treatment, 189
Fry, Henry D., extra-uterine pregnancy, 321
fibroid tumors of uterus, 76
management of labor in minor degrees of pelvic contraction, 239
rectovaginal fistula, 265

Gall-bladder, empyema of, 528
Gastric surgery, 440
Gastritis, suppurative phlegmonous, 378
Gauze pack, inconsistencies of, 218
Goggans, James A., cyst of pancreas, 236
extra-uterine pregnancy, 323
gunshot wound of abdomen, 358
nephritis, 402
pyonephrosis, 471
Goldsmith, William S., treatment of the bladder after suprapubic cystotomy for stone, 56, 67
Gonorrheal epididymitis, 524
Guerry, Le Grand, gunshot wound of abdomen, 348, 358
Gunshot wound of abdomen, 348

Hall, Rufus B., cholecystitis, 207
cyst of pancreas, 229, 237
postoperative complications in abdominal surgery, 43
pulmonary embolism, 376
Harelip and cleft palate, 278

Harmful involution of the appendix, 331
Heart, wounds of, 175
Hematuria in pregnancy, 431
Hendon, George A., gunshot wound of abdomen, 356
treatment of fractures, 168
Hermaphrodism, 418
Hodgen splint, an improved, 129
adjustable, 542
Holden, Gerry R., transperitoneal ureterotomy for ureteral calculus, 467
Horsley, J. Shelton, fractures of skull, 327
harelip and cleft palate, 305
perinephritic abscess following parturition, 483
pulmonary embolism, 372
Humerus, fracture of upper extremity of, 94

Ill, Edward J., sensitive and short uterosacral ligament, 490
Inconsistencies of the gauze pack, 218
Incontinence of urine, cure of, 210
Inoperable sarcoma of neck treated successfully with Coley's toxins, 391
Interdental splint, 540
Intestinal exclusion as a surgical procedure, 337

Johnston, George Ben, fibroid tumors of uterus, 79
hermaphrodism, 418
postoperative complications in abdominal surgery, 42
surgery of the bladder, 65
Joint diseases, chronic, 81

Kelly, Howard A., art applied to medicine and surgery, 1
cyst of pancreas, 236
suture of urethral sphincter, 215
Kidney, decapsulation of, 395
Kirchner, Walter C. G., wounds of heart, 187
Knee-joint, relaxed, treatment of, 189

Leverage in spinal disease, 505
Lewis, Ernest, fibroid tumors of uterus, 77

McGuire, Stuart, harmful involution of appendix, 333
treatment of diffuse suppurative peritonitis, 269, 277
McMurtry, Lewis S., intestinal exclusion as a surgical procedure, 344
treatment of fibroid tumors of the uterus complicated by pregnancy, 68, 80
Management of labor in minor degrees of pelvic contraction, 239

Martin, E. Denegre, traumatic epilepsis, 496
Mason, J. M., fractures of skull, 329
postoperative complications in abdominal surgery, 45
treatment of dislocation at the shoulder-joint complicated by fracture of the upper extremity of the humerus, 94, 171
Matas, Rudolph, interdental splint, 540
operation for aneurysm, 539
pulmonary embolism, 373
technique of thoracotomy and pericardiotomy for wounds of the heart, 175, 188
Mayo, Charles H., cholecystitis, 206
harelip and cleft palate, 301
intestinal exclusion as a surgical procedure, 343
postoperative complications in abdominal surgery, 44
pulmonary embolism, 373, 376
transperitoneal removal of tumors of the bladder, 51, 66
Medicine, art applied to, 1
Miller, C. Jeff, acute dilatation of the stomach as a postoperative complication, 33
Mixter, Samuel J., sarcoma, 401
tracheotomy for foreign bodies in air passages, 552
Morris, Robert T., cholecystitis, 204
fractures of skull, 328
harelip and cleft palate, 307
harmful involution of the appendix, 331, 335
inconsistencies of the gauze pack, 223

Neck, sarcoma of, 391
Nephritis, chronic parenchymatous, 395
Noble, George H., fibroid tumors of uterus, 74
flap-sliding operation for rectovaginal fistula, 263, 267, 268
surgery of the bladder, 65

Oechsner, John F., rubber adhesive strips to the back in obscure pains of pregnancy, 533
treatment of fractures, 163
Ochsner, Edward H., extra-uterine pregnancy, 320
inconsistencies of the gauze pack, 224
intestinal exclusion as a surgical procedure, 344
postoperative complications in abdominal surgery, 49
rectovaginal fistula, 266
Oliver, John Chadwick, chronic parenchymatous nephritis in which decapsulation of both kidneys was practised, 395, 403
inoperable sarcoma of neck treated successfully with Coley's toxins, 391, 403

Pancreas, cyst of, 229
Parham, F. W., fractures of skull, 328
resection of ribs for sarcoma, 527
surgery of the bladder, 63
Patella, fracture of, 537
Pelvic contraction, management of labor in minor degrees of, 239
Perinephritic abscess, 483
Peritonitis, diffuse suppurative, 269
postoperative complications of, 26
Perkins, William M., splenectomy for abscess, 541
treatment of fractures, 167
Pleuritic effusion, 523
Postoperative complications in abdominal surgery, 19
of peritonitis, 26
Practical points in treatment of fractures of femur, 155
Pregnancy, extra-uterine diagnosis of, 308
hematuria in, 431
President, annual address of, 1
Pulmonary embolism, 360
Pyelitis, color bacillus, 524
Pyonephrosis, 471

Ransohoff, Joseph, sarcoma, 402
of brain, 405
venous thrombosis and hydrocele of the inguinal canal, 406
Recent factors in the elucidation of chronic joint diseases, 81
Rectum, sarcoma of, 475
Relaxed knee-joint and its treatment, 189
Resection of ribs for sarcoma, 527
Retroperitoneal cystic adenomata, 426
Robins, Charles R., diffuse suppurative peritonitis, 274
fracture of the femur in forcible delivery, 125
rectovaginal fistula, 267
Rogers, Hack, cholecystitis, 205
cyst of pancreas, 237
treatment of fractures, 170
venous thrombosis and hydrocele of the inguinal canal, 417
Rosser, Charles M., cholecystitis, 206
inconsistencies of the gauze pack, 227
postoperative complications in abdominal surgery, 19, 49
Royster, Hubert Ashley, inconsistencies of the gauze pack, 227
postoperative complications in abdominal surgery, 46
treatment of fractures, 162
Rubber adhesive strips to the back in obscure pains of pregnancy, 533

Sarcoma of brain, 405
of neck, 391
of rectum, 475
resection of ribs for, 527
Sensitive and short uterosacral ligament, 490
Sherrill, J. Garland, gastric surgery, 440
Shoulder-joint, treatment of dislocation of, 94
Skull, fractures of, 324
Smythe, F. D., extra-uterine pregnancy, 322
Spinal disease, leverage in, 505
Splenectomy for abscess, 541
Splint, presentation of, 125
Stomach, acute dilatation of the, as a postoperative complication, 33
Stone, I. S., diffuse suppurative peritonitis, 275
extra-uterine pregnancy, 322
inconsistencies of the gauze pack, 224
postoperative complications in abdominal surgery, 47
retroperitoneal cystic adenomata, 426
suppurative phlegmonous gastritis, 390
surgery of the bladder, 65
Subtemporal decompressive operations for the intracranial complications associated with bursting fractures of the skull, 324
Suppurative phlegmonous gastritis, 378
Suprapubic cystotomy for stone, 56
Surgery, abdominal, postoperative complications in, 19
art applied to, 1
gastric, 440
Suture of urethral and vesical sphincters for the cure of incontinence of urine, 210

Therapy, vaccine, 522
Thigh, fractures of, 129
Thompson, James E., harelip and cleft palate, 302
sarcoma of rectum, 475
Thompson, R. L., pulmonary embolism, 360
Thoracotomy and pericardiotomy, technique of, 175
Tracheotomy for foreign bodies in air passages, 544
Transperitoneal removal of tumors of the bladder, 51
ureterotomy for ureteral calculus, 467
Traumatic epilepsy, 496
Tuberculous ureter, 527
Tumors of bladder, transperitoneal removal of, 51
Twin ectopic pregnancy, 536

Ureter, tuberculous, 527
Ureteral calculus, 467
Urine, incontinence of, 210
Uterosacral ligament, sensitive and short, 490
Uterus, fibroid tumors of, treatment of, 68

Vaccine therapy, 522
Venous thrombosis and hydrocele of the inguinal canal, 406

Watkins, I. L., cholecystitis, 208
rectovaginal fistula, 265
Westmoreland, Willis F., fractures of clavicle, 555
surgery of the bladder, 60
tracheotomy for foreign bodies in air passages, 544, 553
treatment of fractures, 173
Winslow, Randolph, gunshot wound of abdomen, 353
some postoperative complications of peritonitis, 26, 49
tracheotomy for foreign bodies in air passages, 552
treatment of fractures, 167
Wounds of heart, 175

Young, Hugh H., surgery of the bladder, 61, 64
suture of urethral and vesical sphincters for the cure of incontinence of urine, 210, 216

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